# CAPE FEAR TECHNICAL INSTITUTE

# CATALOGUE 1975-1976

"ADMISSION TO ANY AND ALL EDUCATIONAL PROGRAMS OFFERED BY CAPE FEAR TECHNICAL INSTITUTE IS MADE WITHOUT REGARD TO RACE, COLOR, SEX, RELIGION, OR NATIONAL ORIGIN."

# State Board of Education

## Raleigh, North Carolina

To Whomsoever These Presents May Come
Greetings: Know Ye That

**Cape Fear Technical Institute**

**Is Chartered**

By authority of the General Assembly of the State of North Carolina under the terms and provisions of Article 115-A of the General Statutes of said State as a public institution of the North Carolina Community College System having been Originally established on the 3rd day of April, in the year of 1958 as a tax supported institution under the style and title of

**Wilmington Industrial Education Center.**

In Witness Whereof and Certification Thereto, we the undersigned have subscribed our names this 4th day of June, Anno Domini 1964.

DIRECTOR
DEPARTMENT OF COMMUNITY COLLEGES

CHAIRMAN
STATE BOARD OF EDUCATION OF NORTH CAROLINA

Cape Fear Technical Institute is a member institution of the North Carolina Department of Community Colleges—A fully accredited member of the Southern Association of Colleges and Schools—and is accredited by the North Carolina State Board of Education.

RAYMOND P. BRANDT
201 N. 16TH STREET
WILMINGTON, N. C. 28401

# CAPE FEAR TECHNICAL INSTITUTE

411 NORTH FRONT STREET
WILMINGTON, N. C. 28401
PHONE 919-763-9876

## *Catalogue of Information*

**1975 - 1976**

General Information ..... White
Technical Curricula ..... Green
Trade Curricula ..... Yellow
Extension & General Adult Division ..... Blue

Volume X January 1975

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# *Foreword*

The Cape Fear Technical Institute was founded as an area school to meet the occupational training needs of the people of Southeastern North Carolina and of the growing industrial community.

Every effort has been made to provide the equipment, facilities and skilled teachers necessary to allow maximum opportunities for the people to develop new skills, up-date old skills, and further their knowledge to enhance their value to industry and promote their own personal growth.

North Carolina has the most valuable of all resources, a vast reservoir of good people who make fine citizens and excellent employees. Therefore, Cape Fear Technical Institute pledges itself to continue to do all in its power to provide the educational opportunities needed by people to meet the challenging needs of modern industry and help them grow in their understanding and enjoyment of life.

M. J. McLEOD
*President*

## Note

The Cape Fear Technical Institute issues this catalogue for the purpose of furnishing prospective students and other interested persons with information about the institution and its programs. Announcements contained herein are subject to change without notice and may not be regarded in the nature of binding obligations on the Institute or the State. Efforts will be made to keep changes to a minimum, but changes in policy by the State Board of Education, the Department of Community Colleges, or by local conditions may make some alterations in curriculums, fees, etc. necessary.

## Visitors

Visitors, and in particular prospective students, are always welcome at Cape Fear Technical Institute. The student affairs office will provide guide service for groups or individuals on week days between 8:00 a.m. and 5:00 p.m. The school is open until 10 p.m. and individuals may visit at their convenience. Questions about the school and its programs will be answered by someone from the student affairs office.

## Statement of Policy

The contact hours shown in the catalogue are minimal. It is a policy of this institution to permit students to enroll in additional subjects and laboratory work beyond those shown in the catalogue.

When in any quarter the total weekly contact hours listed are fewer than twenty-five hours in a technical curriculum and fewer than thirty hours in a vocational trade curriculum, a student may enroll on request for additional instructional hours deemed by the institution to be consistent with the program and appropriate to the student to make up twenty-five hours per week in a technical curriculum or sufficient hours of attendance to make up thirty hours per week in a vocational trade curriculum.

## Institutional Memberships

An Institutional Member of the American Association of Junior Colleges.

An Institutional Member of the American Technical Society.

An Institution of the North Carolina Department of Community Colleges.

Accredited by the Southern Association of Colleges and Schools.

Accredited by the North Carolina State Board of Education.

# GENERAL INFORMATION

# CAPE FEAR TECHNICAL INSTITUTE

## SCHOOL CALENDAR

### 1975 - 76

## FALL QUARTER

| | |
|---|---|
| Freshman Registration & Orientation | September 8, 1975 |
| Second Year Students Registration | September 9, 1975 |
| Classes Begin for All Students | September 10, 1975 |
| Classes End | November 25, 1975 |
| Thanksgiving Holidays | November 26, 27, & 28, 1975 |

## WINTER QUARTER

| | |
|---|---|
| Pre-registration | November 24, 25, 1975 |
| Registration | December 1, 1975 |
| Classes Begin | December 2, 1975 |
| Classes End | March 1, 1976 |
| Christmas Holidays | December 22, 1975 - December 31, 1975 |
| New Year's Day Holiday | January 1 & 2, 1976 |

## SPRING QUARTER

| | |
|---|---|
| Pre-registration | February 27 & March 1, 1976 |
| Registration | March 2, 1976 |
| Classes Begin | March 8, 1976 |
| Classes End | May 26, 1976 |
| Easter Holidays | April 15, 16, & 19, 1976 |

## SUMMER QUARTER

| | |
|---|---|
| Pre-registration | May 25 & 26, 1976 |
| Registration | May 31, 1976 |
| Classes Begin | June 1, 1976 |
| Classes End | August 17, 1976 |
| Holiday | July 5, 1976 |

## STATE ADMINISTRATION

Benjamin E. Fountain, Jr.—State President, Department of Community Colleges

## STATE BOARD OF EDUCATION

| | |
|---|---|
| Dallas Herring | Rose Hill, Chairman, District 2 |
| John A. Pritchett | Windsor, Vice-Chairman, District 1 |
| James B. Hunt | Lieutenant Governor, Ex Officio |
| Edwin Gill | State Treasurer, Ex Officio |
| G. Douglas Aitken | Charlotte, District 6 |
| R. Barton Hayes | Hudson, District 7 |
| R. R. Manz | Roanoke Rapids, District 3 |
| Earl Oxendine | Raeford, District 4 |
| Mrs. Evelyn S. Tyler | Greensboro, District 5 |
| John W. Reynolds | Asheville, District 8 |
| Mrs. Mildred S. Strickland | Smithfield, Member-at-large |
| Dr. Prezell R. Robinson | Raleigh, Member-at-large |
| Richard C. Erwin | Winston-Salem, Member-at-large |
| A. Craig Phillips | Secretary to the Board |

## LOCAL BOARD OF TRUSTEES

William Emmart, Chairman, First-Citizens Bank & Trust Co., 8 North Front Street, Wilmington, N. C.
R. L. Burnett, Vice-Chairman, New Hanover Memorial Hospital, Wilmington, N. C.
V. A. Creech, Jr., Fairview Road, Leland, N. C.
L. M. Cromartie, 123 W. Shipyard Boulevard, Wilmington, N. C.
Dr. Hubert A. Eaton, Jr., 411 Seventh St., Wilmington, N. C.
Fred J. Galehouse, 110 Green Forest Drive, Wilmington, N. C.
G. W. Graves, Graves Electric Co., Wilmington, N. C.
Alfred A. Johnston, 2617 Mimosa Place, Wilmington, N. C.
Eugene McWatty, S & G Concrete, 2812 Monroe Street, Wilmington, N. C.
W. Mercer Rowe, South Atlantic Services, Inc., Post Office Box 1886, Wilmington, N. C.
Mrs. Conrad B. Schwarz, 1207 Columbus Circle, Wilmington, N. C.
Frederick Willetts, Jr., Cooperative Savings & Loan Association, 201 Market Street, Wilmington, N. C.

## OFFICERS OF THE ADMINISTRATION

| | |
|---|---|
| M. J. McLeod | President |
| Clarence E. Dodgens | Dean of the Institute |
| Ralph Bordeaux | Director of Evening Programs |
| E. T. Satterfield, Jr. | Dean of Student Affairs |
| Matthew C. Donahue | Director of Technical & Vocational Programs |
| Arthur W. Jordan | Coordinator of Ship Operations & Chief Investigator for Sea Grants |
| Kenneth D. Futch | Coordinator of Continuing Education & Director for Pender County Extension |
| John R. Kennedy | Director of Continuing Education—Brunswick |
| Fitzhugh Fennell | Director of Continuing Education—New Hanover |
| John M. Braswell | Director of Basic Adult Education |
| S. C. Coleman | Business Manager |
| Sadie M. Lea | Bookkeeper |
| Gwendolyn W. Smith | Bookkeeper |
| Ronald G. Mihal | Administrative Assistant |
| Robert D. Bass | Registrar |
| Carl E. Malpass | Counselor |
| Charles F. Hunnicutt | Counselor |
| Roger A. Greenleaf | Evening Registrar—Counselor |
| Henry J. Bethea | Director of Student Activities |
| Thomas A. Olson | Veterans Coordinator |
| Dana McClure | Director of Testing |
| Dan Hickman | Supervisor of Evening Instruction |

## AREA COORDINATORS

| | |
|---|---|
| John R. Willis | Fishing Trades |
| Ralph W. Roper | Police Training |

## LEARNING RESOURCE CENTER

| | |
|---|---|
| Willie B. McGough, Jr. | Director of Learning Resource Center |
| Roy T. Barnhill | Librarian |
| Madison Mosley | Librarian |
| Nixon B. Howard | Library Technician |
| Alta W. Moore | Library Technician |
| Steve Daniels | Graphic Artist Technician |

## PROGRAMMED INSTITUTION CENTER

| | |
|---|---|
| Charlotte Dexter | Director |
| Thomas J. Bradshaw | Coordinator |
| Ernest D. Bryant | Coordinator |
| James Canty | Coordinator |
| Christopher K. Zingelmann | Coordinator |
| Robert G. Millis | Part-Time Coordinator |

## STAFF—SPECIAL PROGRAMS

| | |
|---|---|
| Charles W. Miller | Coordinator of Disabled & Handicapped Programs |
| Frances Nunnery | Basic Job Instructor |
| Robert E. Thomson | Basic Job Instructor for Disabled & Handicapped Persons |
| Rick Stewart | Director of Human Resource Development |
| Pamela Swinson | HRD Instructor |
| Lonnie G. Williams | HRD Instructor |

## FACULTY BY DIVISIONS

### BUSINESS EDUCATION

| | |
|---|---|
| Sessoms, Robert W., Division Chairman | Accounting |
| Barefoot, Emily W. | Typing and Related |
| Coleman, Mary D. | Business Related |
| Graham, Katie Mae | Business Related |
| Kermon, Gail | Business Related |
| Tyndall, Roland E. | Typing and Related |
| West, Geraldine J. | Shorthand and Related |

### ENGINEERING

| | |
|---|---|
| Batts, Chauncey W., Jr., Division Chairman | Drafting |
| Buis, Charles | Drafting |
| Coleman, William H., Jr., Department Head | Electronics |
| Eckhardt, Owen S. | Chemistry |
| Holt, Russell | Electronics |
| Parker, Carl | Marine Construction |
| Rochelle, Edward | Industrial Electricity |
| Simmons, Wayne P. | Radio and Television Servicing |
| Spencer, Joel S. | Drafting |
| Stroman, Arthur W., III | Electronics and Related |

MARINE

| | |
|---|---|
| Foss, Edward L., Division Chairman | Oceanography |
| Bahen, James | Fishing Trades |
| Bryan, Joseph T. | Navigation |
| Buck, Dale R. | Oceanography |
| McClelland, Roy K. | Marine Engineer |
| Martin, James R. | Biology |
| Meyland, Sarah | Marine Technology Related |
| Price, Henry | Marine Electronics |
| Raynor, Bruce | Assistant Marine Superintendent |
| Rhodes, Samuel T. | Biology |

MECHANICAL

| | |
|---|---|
| Klimek, Francis B., Division Chairman | Automotive Mechanics |
| Horton, Grag | Heating and Air Conditioning |
| Nunn, James R. | Machine Trades |
| Poythress, Marion T. | Heavy Mechanics Equipment |
| Tillett, Wiley S. | Automotive Mechanics |
| Watters, James L. | Welding |
| Williams, Alvin | Welding |

MEDICAL EDUCATION

| | |
|---|---|
| Ambrose, Blanche W., Division Chairman | Nursing Education |
| Jackson, Marjorie S. | Nursing Education |

RELATED INSTRUCTION

| | |
|---|---|
| Averette, Roger H., Division Chairman | Physics |
| Barker, William G., Department Head—Academic Related | Mathematics |
| Bright, Ladson | English |
| Cooper, Claude | Social Studies |
| Cooper, Ida | English |
| Entwistle, Joyce | English |
| Faison, James H., Jr. | Related Subjects |
| Jorgensen, Philip C. | Mathematics and Science |
| Kellagher, Richard | Trade Related |
| Mangum, William A. | Mathematics |
| Marteney, Lawrence L., Department Head—Mechanical & Engineering | Technical Related |
| Seeger, David C. | Related Subjects |
| Thompson, Aubrey | Physics |
| Thompson, Sonya | Technical Related |
| Young, John C., Jr. | English |

TECHNICIANS

| | |
|---|---|
| Carter, Marie | Marine Lab Technician |
| Daniels, William Steve | Graphics Artist Technician |
| Howard, Nixon B. | Audio-Visual Technician |
| Huddleston, Marvin E. | Purchasing Agent |
| Miller, Mark | Marine Technician |
| Morrow, Kathy | Chemical Technician |
| Thomas, John D. | Marine Technician |

## SHIP'S PERSONNEL

| | |
|---|---|
| Jordan, Captain Arthur W. | Coordinator of Ship Operations |
| Craig, William D. | Captain |

**Deck Department**

| | |
|---|---|
| Lewis, Howard E. | Chief Mate |
| Wolfe, R. Ernest | Second Mate |
| Heide, Eberhard | Able-Bodied Seaman |
| Phillips, Robert | Able-Bodied Seaman |
| Atkinson, DeLane | Able-Bodied Seaman |
| Roberts, John C. | Bosun |
| Brown, Luther | Ordinary Seaman |

Steward's Department

| | |
|---|---|
| Cowan, Frank, Jr. | Chief Cook |
| Allen, William | Second Cook |
| Fisher, Wallace L. | Officers' Steward |

Engineering Department

| | |
|---|---|
| Watson, Harold B. | Chief Engineer |
| McNamara, John A. | First Assistant Engineer |
| Bryan, Leslie | Second Assistant Engineer |
| Unverferth, Robert A. | Oiler |
| Liske, Robert, Jr. | Oiler |
| DeVane, James | Oiler |

Specialists

| | |
|---|---|
| Sigman, Roy | Ship's Electrician |
| Newton, Cleo | Assistant Ship's Electrician |
| Weddle, Daniel J. | Electronics Technician |
| Malpass, Mitchell | Marine Technician |
| Raynor, Bruce | Assistant Marine Superintendent |

# THE SCHOOL

## HISTORY

The Cape Fear Technical Institute was established as the Wilmington Industrial Education Center in 1959 under the direction of the late George H. West. It was raised to technical institute status on July 1, 1964.

Cape Fear Tech is one of more than fifty such institutions operated by the State under the direction of the State Board of Education and the Department of Community Colleges in Raleigh. The school is administered by a local Board of Trustees.

Authority for the establishment and operation of these institutions is found in Chapter 115A of the General Statutes of North Carolina and the amendments thereto.

The Institute was one of the original industrial education centers and was operated from 1959 through the 1963 school year by the New Hanover Board of Education. Following a favorable vote of the citizens of the County on a $575,000 bond issue to provide a technical institute facility, and a 2c tax levy for its support, the State Board of Education authorized $500,000 in matching funds from the 1963 Vocational Education Act Appropriation to be applied toward the facility construction. The Institute continued to operate in the County owned buildings until the new facilities were completed in the summer of 1967. The new facilities included a four story main building, a separate automotive shop, and a pier and docking facility for the school's ship, the Advance II. In the general election of 1972 the citizens of New Hanover County approved a bond issue of $3,675,000.00 for the expansion of Cape Fear Technical Institute's facilities. Construction will include additions to the Main Building and additional shop facilities. Construction will continue throughout 1973 and 1974 with completion scheduled for 1975.

The number of people served annually by the Institute has risen from approximately 750 during its early years of operation to more than 13,000 in recent years. The school has been and continues to be dedicated to total education for adults in the area it serves.

## PURPOSE

Cape Fear Technical Institute is comprehensive in its purpose and in its plan to meet the needs of the adult population within the community it serves. The Institute provides flexible programs designed to meet these adult educational needs through:

(1) A continuing concern for the total welfare of each student including his physical and mental health, development of capaci-

ties and talents, establishment of relationships with other persons, and motivation for progress in intellectual understanding.

(2) Various vocational-technical and trade programs which will prepare a student for employment in a specialized field.

(3) Courses and programs for the adult student who wishes to further his education at the elementary and secondary level, or for an adult who wishes to improve his economic, social, or cultural needs.

(4) Programs to serve new and existing industries by training new employees and upgrading others.

(5) Programs to serve the community by training employees for public services.

(6) Continuous curriculum study and revision of existing programs to meet the needs of the community.

Finally, the Institute strives to live up to the "open door" admissions policy established by the North Carolina Department of Community Colleges. The Institute is concerned with the student's willingness to do, and with providing entry programs at all capability levels. The Institute encourages the student to develop abilities and attitudes which will make him feel that he is a participating, worthwhile, dignified member of his community.

## LOCATION

The Cape Fear Technical Institute is conveniently located in the heart of Wilmington on North Front Street. The campus extends from Front Street to the deep water channel of the Cape Fear River, and is bordered by Red Cross Street on the North and Walnut Street on the South. Some parking space is available on the campus, public transportation is nearby, and hotels, motels, restaurants, theaters, and shops are all within easy walking distance.

The four-story building houses the administrative offices, library, laboratories, classrooms, student lounge, and part of the shop areas. An additional shop building is located at the water's edge, and a pier extends out to the deep-water channel to provide mooring for the 185-foot school ship, the SS Advance II. The buildings are of all-masonry construction, and designed especially for trade and technical programs. All classrooms and offices are air-conditioned for year-round comfort.

The Wilmington area has abundant recreational facilities, excellent beaches, salt- and fresh-water fishing, good hunting areas; year-round golf courses and tennis courts are all located within a few minutes driving range.

## SHOPS & EQUIPMENT

The shops and laboratory areas were carefully planned to provide large, well-ventilated, and industry-type training facilities.

Equipment for all shops, laboratories, test areas, drafting rooms, and for the training ships was selected to conform with the current tools and devices of industry. Students will find that ample opportunity is provided in all trade and technical curricula for skill-building practice in using modern, industrial, production and testing tools and machines. Specially planned and equipped classrooms are conveniently located for study of the academic related subjects, and a well-stocked technical library is available both day and night for use by faculty, students and area residents.

## QUARTER SYSTEM

The school year is divided into four quarters of 55 school days. Credits earned are in quarter hours. See course description section for number of credits required for graduation in each program.

## AREAS OF STUDY

Technical and trade curriculums which the Institute is presently authorized to offer include the following:

Technical Curricula:

See technical section (Green) of catalogue for descriptions.

Business Administration
Chemical Operations Technology
Drafting & Design Technology
Electronics Technology
General Office Technology
General Occupational Technology
Instrumentation Technology
Marine Construction Engineering Technology
Marine Electronics (Special Technology, one quarter only)
Marin Laboratory Technology
Marine Technology
Secretarial-Engineering and Technical

Persons graduating from these technical curriculums are awarded the Associate in Applied Science Degree:

Vocational Curricula:

See trade section (Yellow) of catalogue for descriptions.

Auto Body Repair
Automotive Mechanics
Commercial Fishing
Drafting, Mechanical
Heating and Air Conditioning

Heavy Equipment Mechanics
Industrial Electricity
Industrial Air Conditioning (6 months)
Industrial Machine Operator (6 months)
Machine Trades
Marine Diesel Mechanics
Operating Room Assistant—This course offered periodically
Practical Nurse Education
Radio and Television Servicing (Electronic Servicing)
Welding

A diploma is earned by graduates of these vocational programs.

## ENTRANCE REQUIREMENTS

All correspondence concerning admissions should be addressed to The Admissions Office.

**ADMISSION OF NEW STUDENTS**—The Cape Fear Technical Institute follows the "Open Door" policy established by the State Board of Education. This policy provides for the admission of any North Carolina citizen who has reached the age of 18, or whose high school class has graduated. This policy is based on the belief that the school has something to offer at all educational levels and that through effective guidance a person can find his or her place in the proper educational program.

While a high school education or its equivalent*, is desirable for admission to the full-time training programs, some exceptions are made for individuals whose age and maturity make success in a diploma program likely.

See individual course description in this catalogue for specific admission requirements, prerequisites, etc., for each course.

## ADMISSION CRITERIA

1. **Previous Education**—Each applicant shall request his or her high school to submit a transcript showing graduation. Those who are high school seniors should have their school submit a transcript showing work through the first semester of the senior year as soon as possible after the semester has ended, and a supplementary transcript showing graduation at the close of school.

Applicants who have the high school equivalency certificate* should submit a copy of the certificate, but should also ask their high school to send transcript of all work done at the school.

Transcripts of previous education in colleges, technical institutes, etc., should also be submitted to the school. All transcripts must come directly from the school to the Technical Institute and not from the applicants themselves.

*See page 186 in General Adult Education Section of this catalogue for details about the high school equivalency certificate.

2. **Placement Test**—Students are required to take placement test/s prior to entrance. Qualified counselors at the school use the test results in helping individuals decide which course of study to follow. There is no charge for the test, nor for the counseling service.

3. **Personal Interview**—The personal interview is beneficial to both the applicant and to school officials in that it affords an opportunity to "get acquainted." The applicant has an opportunity to ask questions about the school and its programs while school officials make an effort to evaluate the applicant's interest in, and capability to pursue the program of study applied for.

4. **Medical**—Complete medical form provided by the school.

## ADMISSION OF OUT-OF-STATE STUDENTS

Out-of-state students are admitted under the same regulations as others. Tuition and fees are established by the State Board of Education.

1. **General.** The tuition charge for legal residents of North Carolina is less than for non-residents. To qualify for instate tuition a legal resident must have maintained his domicile in North Carolina for at least 12 months immediately prior to his classification as a resident for tuition purposes. In order to be eligible for such classification, the individual must establish that his or her presence in the State during such twelve-month period was for purposes of maintaining a bona fide domicile rather than for purposes of mere temporary residence incident to enrollment in an institution of higher education.

2. **Domicile.** Domicile means one's permanent dwelling place of indefinite duration, as distinguishd from a temporary place of abode.

3. **Burden of proof and statutory presumptions.** The burden of establishing facts which justify classification of a student as a resident entitled to in-state tuition rates is on the applicant for such classification. Proof of residential status is controlled, initially, by two statutorily prescribed complementary presumptions, which are stated in terms of prima facie evidence:

a. If the parents or court-appointed legal guardian of the student (without reference to the question of whether the student is a minor or an adult) are not domiciliaries (legal residents) of North Carolina, such fact shall constitute prima facie evidence that the student is not a domiciliary (legal resident) of North Carolina, and the student must assume the burden of rebutting the prima facie showing by producing evidence that he, independently is in fact a domiciliary (legal resident) of North

Carolina, in spite of the nonresidential statue of his parents:

b. Conversely, if the parents of the student are domiciliaries of North Carolina, such fact shall constitute prima facie evidence that the student is a domiciliary of North Carolina. If the student has neither parents nor legal guardians, the prescribed concept of prima facie evidence cannot and does not apply.

4. **Minors.** A minor is any person who has not reached the age of eighteen years. The domicil of a minor is that of the father. With a few exceptions noted below, this presumption is virtually irrebutable. If the father is deceased, the domicile of the minor is that of the surviving mother. If the parents are divorced or legally separated, the domicile of the minor is that of the parent having custody by virtue of a court order; or, if no custody has been granted by virtue of court order, the domicile of the minor is that of the parent with whom he lives; or, if the minor lives with neither parent, in the absence of a custody award, the domicile of the minor is presumed to remain that of the father. Even though a person is a minor, under certain circumstances the person may be treated by the law as being sufficiently independent from his parents as to enjoy a species of adulthood for legal purposes. The consequences, for present purposes, of such circumstances is that the affected person is presumed to be capable of establishing a domicile independent of that of the parents; it remains for that person to demonstrate that a separate domicile in fact has been established. The circumstances recognized as having the potentially emancipating effect are:

a. Marriage of the minor person;

b. Parental disclaimer of entitlement to the minor's earnings and the minor's proclamation and actual experience of financial independence from his parents, with the actual establishment and maintenance of a separate and independent place of residence.

5. **Married Women.** The domicile of a wife is presumed to follow that of her husband; the converse is not presumed. The significance of the marital relationship is limited to use of the presumption that a woman who marries a North Carolina domiciliary becomes, by virtue of such marriage, a domiciliary of North Carolina. Under such circumstances, the wife still must maintain that status for a minimum period of twelve months before she is eligible to be classified as a resident for tuition purposes.

6. **Military Personnel.** The domicile of a person employed by the Federal Government is not necessarily affected by assignment in or reassignment out of North Carolina. Such a person may establish

domicile for himself by the usual requirements of residential act plus intent. No person shall lose his in-state resident status by serving in the armed forces outside of the State of North Carolina.

7. **Property and Taxes.** Ownership of property in or payment of taxes to the State of North Carolina apart from legal residence will not qualify one for the in-state tuition rate.

8. **Change of Status.** A student admitted to initial enrollment in an institution (or permitted to re-enroll following an absence from the institutional program which involved a formal withdrawal from enrollment) shall be classified by the admitting institution either as a resident or as a non-resident for tuition purposes prior to actual matriculation. A residential classification once assigned (and confirmed pursuant to any appellate process invoked) may be changed thereafter (with a corresponding change in billing rates) only at intervals corresponding with the established primary divisions of the academic calendar.

9. **Responsibility of Students.** Any student or prospective student in doubt concerning his residence status must bear the responsibility for securing a ruling by stating his case in writing to the admissions officer. The student who, due to subsequent events, becomes eligible for a change in classification, whether from out-of-state to in-state or the reverse, has the responsibility of immediately informing the Office of Admissions of this circumstance in writing. Failure to give complete and correct information regarding residence constitutes grounds for disciplinary action.

10. **Appeals of Rulings of Admission Officers.** A student appeal of a classification decision made by any admissions officer shall be filed by the student with that officer in writing and shall be transmitted to the Residence Status Committee by that officer, who shall not vote in that Committee on the disposition of such appeal. The student shall be notified of the date set for consideration of the appeal and, on request of the student, he or she shall be afforded an opportunity to appear and be heard by the Committee. Any student desiring to appeal a decision of the Residence Status Committee shall give notice in writing of that fact within 10 days of receipt by the student of the decision of the Residence Committee, and the basis for such appeal, to the Chairman of the Residence Committee, and the Chairman shall promptly transmit the appeal to the State Residence Committee.

Regulations concerning the classification of students by residence for purposes of applicable tuition differentials, are set forth in detail in **A Manual To Assist The Public Higher Education Institutions of North Carolina in the Matter of Student Residence Classification for Tuition Purposes.** Each enrolled student is responsible

for knowing the contents of this **Manual,** which is the controlling administrative statement of policy on this subject. Copies of the Manual are available on request in the Student Affairs Office.

**ADMISSION OF TRANSFER STUDENTS**—The Dean of Student Affairs along with the Admissions Counselor and Subject Instructor will review applications for admission with advanced standing. Where subject content and length of course are comparable with those in the curriculum applied for, credit may be allowed for grades of "C" or above. Transfer credits will not influence the students grade point average while at Cape Fear Technical Institute. In certain cases where the school and the student believe an alternate course would be more beneficial to the student, such alternate course may be allowed.

**ADMISSION OF SPECIAL STUDENTS**—Students entering a diploma or degree program will be allowed to take up to 12 quarter hours credit before submitting all admissions requirements.

**ADMISSION OF FORMER STUDENTS**—All former students who left the school in good standing are encouraged to enroll for additional study at the Institute.

**ADMISSION OF NON-IMMIGRANT ALIEN STUDENT**—"This school is authorized under Federal law to enroll non-immigrant alien students."

**TRANSFER WITHIN THE INSTITUTE**—Students that desire to change from one program to another may have their records reviewed for possible transfer of credit. In cases where grades are acceptable, and prior course work is applicable to the new curriculum, transfer may be allowed. Transfer of credits will not influence the student's Grade Point Average in the new program.

**PROFICIENCY EXAMINATION**—Credit by proficiency examination may be given for a course. Eligibility to take a proficiency examination may be based on high achievement in secondary school, post secondary schools, or experience. Arrangements for examination should be made with the major subject instructor, Division Chairman and Dean of Student Affairs.

**FRESHMAN ORIENTATION**—Freshman Orientation is provided for full time students entering CFTI for the first time. Orientation informs the student about the academic and social policies of the Institute, and acquaints him with the library and other facilities. Upper-classmen assist in orientation and help answer questions about the Institute's policies and procedures.

**REGISTRATION**—Students who have been admitted, and who have paid their admission deposit (see page 19 for information on

this deposit) will register on the dates set by the school for this purpose. Students will obtain their class schedules, pay their fees and purchase their books. Late registrants are charged a $5.00 late registration fee.

**COURSE LOAD**—A Student who carries a minimum of 12 quarter hours is considered a full time student. The normal load is 14-18 quarter hours.

**AUDITING COURSES**—Students who wish to audit courses must register for the audit by following the regular registration procedures. Auditing students receive no credit and are not required to participate in class discussion or take tests. The fees for audit courses are the same as those taken for credit.

**DROP-ADD PERIOD**—Students will be allowed to drop or add courses within 10 calendar days from the date the classes begin.

**HOW MUCH DOES IT COST?**—All fees are established by the State Board of Education. Currently tuition is charged at the following rates for all curriculum courses:

North Carolina Students:

| | |
|---|---|
| Full Time | $33.00 per quarter |
| Part Time | $2.75 per quarter hour credit |

Out-of-State Students:

| | |
|---|---|
| Full Time | $137.50 per quarter |
| Part Time | $11.45 per quarter hour credit |

Books and small tools are purchased by students as they are needed. The Institute attempts to keep the cost of books and tools at a minimum. A $4.50 activity fee is charged at the beginning of each Fall, Winter and Spring quarter.

Degrees, diplomas, caps and gowns are ordered directly from a company representative during the spring quarter of each year. The cost of these items is not included in the activity fee, but is paid directly by the student to the company representative at the time of order.

All students who work in laboratories or shops should purchase accident insurance; this insurance presently costs $3.50 per year. The cost of insurance is subject to change as determined by the company offering the coverage.

## WHEN ARE PAYMENTS MADE?

When an applicant is officially admitted to a course of study, he is required to make a $15.00 tuition deposit. This deposit is nonrefundable except in cases where the school is unable to admit the person or unable to offer the course applied for.

All tuition and fee charges are due and payable on the day of registration; however, in circumstances beyond a student's control, monthly payments may be permitted. Any deferred payments or exceptions to rules on financial affairs must be approved by the Business Manager.

The accident insurance is purchased on registration day of the first quarter of attendance.

No student will be permitted to graduate, nor will a transcript be issued until all financial obligations to the school are satisfied.

## REFUND

Tuition refund for students shall not be made unless the student is, in the judgment of the institution, compelled to withdraw for unavoidable reasons. In such cases, two-thirds (2/3) of the student's tuition may be refunded if the student withdraws within ten (10) calendar days after the first day of classes as published in the school calendar. Tuition refunds will not be considered after that time. (Tuition refunds will not be considered for tuitions of five dollars ($5.00) or less, except if a course or curriculum fails to materialize, all the students' tuition shall be refunded.)

Where a student, having paid the required tuition and fees for a quarter, withdraws from the institution before the end of the quarter and the reasons for the withdrawal are found excusable by the institution's administration, the student may be allowed credit for unrefunded tuition and fees if he applies for re-admission during any of the next four calendar quarters and petitions in writing to be allowed such credit.

## STUDENT FINANCIAL AID

Limited financial aid is available through gifts or loan funds provided by individuals or civic groups. This program is administered through the services of a Financial Aid Officer located in the Student Personnel Division.

The financial aid program is as follows:

1. **New Hanover Medical Society Loan Fund.**

   This is a revolving loan fund established by the Medical Society for students in the Practical Nurse training program.

2. **East Wilmington Rotary Club Loan Fund.**

   Loans are made to students recommended by the school. No interest is charged while the student is in school.

3. **Wilmington Jaycee's Scholarship Fund.**

   The Jaycees have made available scholarships to be used for

paying tuition. The extent of these scholarships are determined by the amount of funds available.

4. **Wilmington Chapter of the National Association of Women in Construction Scholarship.**

The Wilmington Chapter of Women in Construction makes available a scholarship to any student who is studying in a construction related curriculum. At the present time any student in either the Drafting Programs, Heating and Air Conditioning, or Marine Construction Engineering Technology is eligible to apply for the scholarship. Selection of the scholarship recipient is made by the Financial Aid Officer. Eligibility for the scholarship is based on the following criteria: (1) appropriate curriculum, (2) financial need, (3) must show educational promise.

5. **Cape Fear Lion's Club Scholarship Fund.**

The Cape Fear Lion's Club makes available a novel idea in student aid in that a prospective student with a visual handicap or whose parents have a visual handicap will receive a scholarship to be used for paying tuition. The extent of this scholarship will be determined by the amount of funds available.

6. **Auxiliary to Medical Society of New Hanover County.**

This loan is established by the Auxiliary to Medical Society of New Hanover County for those students in medical or health career fields who would not be able to complete this program without such a loan. This loan is made without any interest charge to the student. When the student has graduated or ceases to be in full time attendance, he or she is required to start re-payment of the loan in monthly installments. In order for a student to be eligible for the loan, he or she must: (1) be of financial need, (2) show and maintain good standing at this school, (3) be in a medical or health career field of study.

7. **Eastern Carolina Section of the American Welding Society Scholarship.**

The ECSAWS has made available a scholarship in the amount of $150.00. To be eligible for this scholarship, a student must be: (1) in full time Welding program, (2) of financial need, (3) a resident of New Hanover, Pender or Brunswick County.

8. **Wilmington Chapter of the North Carolina Jr. Sorosis Scholarship.**

The Wilmington Chapter of the N. C. Jr. Sorosis awards a $96.00 scholarship to a needy student at Cape Fear Technical Institute. The student must be enrolled in the second year of his or her curriculum. Selection of the scholarship recipient is made by the Director

of Financial Aid. Eligibility for the scholarship is based on the following criteria: (1) Second year student in chosen curriculum, (2) must be of financial need, (3) resident of New Hanover County, (4) must show educational promise.

When funds are available, this school participates in:

9. **Supplemental Educational Opportunity Grant.**

The SEOG program was established by Title IV, Part A, of the Higher Education Act of 1965 (Public Law 89-329). The maximum grant is $1,500 and minimum grant is $200. Title VI of the Civil Rights Act of 1964 states: "No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving Federal financial assistance." Therefore, the SEOG program, like the Department of Health, Educational and Welfare, must be operated in compliance with this law. The SEOG shall be made for the period required by the student to compete his course of study. In no event should such a period exceed four academic years.

To be eligible for a SEOG, a student must be: (1) a high school graduate or the equivalent, (2) a national of the United States, or is in the United States for other than a temporary purpose and intends to become a permanent resident thereof, (3) a full time student in either the degree or diploma programs, (4) of acadmic or creative promise, and capable of maintaining good standards in his course of study, (5) of exceptional financial need and would not be able to attend the Institute without such a grant.

10. **Basic Educational Opportunity Grant Program.**

The purpose of the Basic Educational Opportunity Grant program is to make available grants to qualified students in Title IV, Part A of the Educational Amendments of 1972. The maximum amount of the grant is $1,400 less the parental contribution. The Grant cannot exceed one-half the costs of the education.

To be eligible to receive this grant the student must meet the following qualifications: (1) must be of financial need, (2) must be a student carrying at least a half time work load as determined by the Institute, (3) must be capable in the opinion of the Institute of maintaining good standards, (4) must be a national of the United States, or a person who is in the United States for other than a temporary purpose and intends to become a permanent resident thereof. Persons who are in this country on a F student Visa or a Visitor Visa are not eligible.

11. **College Work-Study Program.**

The purpose of the College Work-Study Program is to make

available to students the opportunity to work part time while attending an institution of higher education. The CWSP is particularly for those students from low income families. Students are allowed to work part time for any non-profit organization at an hourly rate ranging from $1.80 to $2.50. Eligibility for the CWSP is based on the following qualifications: (1) Need of the earnings from such employment in order to pursue a course of study at the Institute, (2) capable, in the opinion of the Institute, of maintaining good standing in such course of study, (3) accepted for enrollment as a full time student at the Institute or in good standing, (4) a national of the United States, or in the United States for other than a temporary purpose and intends to become a permanent resident thereof.

**12. Vocational Work-Study Program.**

The Vocational Work-Study Program is a program operated by a local institution designed to provide part time employment for youth who need the earnings from such employment to commence and continue their education on a full time basis. This form of financial aid is provided in the Vocational Education Act of 1963, as amended. The maximum amount of time a student can work in this program is 28 hours per month or $45.00. The student criteria for this program are: (1) have been accepted for enrollment as a full time student or in the case of a student already enrolled, in good standing; and in full time attendance, (2) in need of earnings from such employment to attend school, (3) have attained at least 15 years of age and less than 21 at the commencement of employment, and are capable of maintaining good standing in the school.

**13. National Direct Student Loan.**

The purpose of the NDSL is to make loans available to qualified students in need of financial assistance to pursue a course of study on at least a half time basis at this school. These loans are made on a long-term and at a low interest rate. The maximum amount available to students in two academic years is $2,500.

To be eligible for this loan, a student must be: (1) of financial need, (2) a student carrying at least a half time work load as determined by the Institute, (4) a national of the United States, or a person who is in the United States for other than a temporary purpose and intends to become a permanent resident thereof. Persons who are in this country on a F Student Visa or a Visitor Visa are not eligible, (5) No student of Medicine, Dentistry, Osteopathy, Optometry, Podiatry, Veterinarian medicine, or Pharmacy who is eligible to receive a loan from a fund establishment under the

Health, Student Loan Program at the Institute he is attending will be eligible for this loan.

### 14. "G. I. Bill" Vietnam Era Veterans' Readjustment Act of 1974—PL 93 - 508

Most programs offered by the Institute are approved for training under the "G. I. Bill" Title 38, United States Code, most recently amended by Public Law 93 - 508. Veterans desiring to train under the benefits of this Bill must first establish their eligibility with the Veterans Administration. In general, Veterans who served in the Armed Forces since January 31, 1955, and who were discharged under conditions other than dishonorable, qualify for training under the "G. I. Bill". The amount of training permitted is determined by the number of months of active service.

Veterans are admitted under the same admission requirements as other students. They pay tuition and attend school under the same regulations as others. The only difference between a Veteran and other students is that a Veteran is paid monthly benefits by the Veterans Administration, an amount determined by the type of program he is enrolled in, hours attended, and the number of dependents he has. To be classified as a full time student, a Veteran must be registered for at least 12 quarter hours credit in a technical program, or if enrolled in a trade program, he must attend a minimum of 22 hours per week.

Certain servicemen or active duty personnel are also eligible for training under this Bill. Those interested should contact their Education Officer at their duty station.

Additionally, dependents of certain Veterans are eligible for training under this Bill. Eligibility must be established with the Veterans Administration.

Full details on training programs under the "G. I. Bill" may be obtained from any Veterans Service Office or the school's Veterans Coordinator.

The Veterans Service Office for New Hanover County is located in the First Union National Bank Building in downtown Wilmington, for Pender County in the County Building in Burgaw, and for Brunswick County at the Police Station in Southport or the Health Center in Shallotte.

### 15. Vocational Rehabilitation.

Vocational Rehabilitation is a program operated through the Division of Vocational Rehabilitation in cooperation with the North Carolina Department of Public Instruction and the Federal Office of the Vocational Rehabilitation Administration. The Division is financed by State and Federal funds. Vocational Rehabilitation offers such services as are necessary to enable a physically or men-

tally employment-handicapped person to become self-supporting. Financial assistance is available for training at the Cape Fear Technical Institute for eligible handicapped persons.

If a prospective student has a physical disability or is limited in his activity because of a disability he should contact the Division of Vocational Rehabilitation Office nearest him. The Division Office for Southeastern North Carolina is located at 709 Market Street in Wilmington, N. C.

## FEDERAL PROGRAMS

The Technical Institute cooperates with various federal agencies which provide financial assistance to occupational education trainees. Full information about such programs, when they are available, may be obtained from the Student Affairs section of the Institute.

## THE LIBRARY LEARNING RESOURCE CENTER

The Cape Fear Technical Institute Library Learning Resource Center is located on the second floor of the main building. The Center provides learning facilities for faculty and students, including a current collection of some 12,500 volumes, subscriptions to over 100 periodicals and newspapers, disc and tape recordings, microfilm, filmstrips, 35mm slides, 8mm film loops, 16mm films, and audio tape recordings. Now under construction are facilities for the production and presentation of film and video teaching units, as well as a complete woodworking shop for use by the faculty for the construction of teaching models.

From time to time, traveling exhibits of art and handicraft from the North Carolina Museum of Art, Raleigh, N. C., and the National Gallery of Art, Washington, D. C., as well as Cape Fear Technical Institute student workmanship are placed on display.

While the center, for the most part, relates to the trade and technical programs offered by Cape Fear Technical Institute, and is primarily for the students and faculty, residents of the area served by Cape Fear Technical Institute, and particularly industrial employees, are invited to make use of it.

## COUNSELING SERVICES

Qualified counselors are available to assist students in selecting an appropriate course of study, to provide occupational and educational information and to discuss scholastic or personal problems which may arise.

## GRADE POINT AVERAGES AND GRADING

Letter grades are used at Cape Fear Technical Institute in reporting grades to students; however, such terms as 3.2, 2.6, and 1.89

will be used. These are called "grade point averages," and are very important. They are earned on the following basis:

| GRADE | Numerical Equivalency | Significance | Quality Points Per Quarter Hour |
|---|---|---|---|
| A | 94-100 | Superior | 4 |
| B | 86-93 | Good | 3 |
| C | 78-85 | Average | 2 |
| D | 70-77 | Poor | 1 |
| E | Below 70 | Failure | 0 |
| I | Incomplete | Incomplete | 0 |
| WP | | Withdrawal | 0 |
| WF | | Withdrawal Failing | 0 |

**Incomplete Grades**

Incomplete will be given only when circumstances justify additional time to complete the course. An incomplete must be removed within six weeks following the quarter it was received. Grades not made up within six weeks will be recorded as an "E".

Report cards are mailed to the student's home shortly after the end of each quarter.

**What is a "Quarter Hour Credit"?**

Each course listed is followed by a notation on the number of quarter hours it carries. Normally, the number of quarter hours earned is based on the number of class, laboratory or shop hours spent under the supervisor or the course instructor per week for the quarter.

Usually 1 quarter hour credit is given for each hour of class per week, for each two hours of laboratory work per week, or for each three hours of shop or manipulative laboratory per week. (A class hour requires a minimum of 50 minutes of instruction.) Classroom portions require outside preparation, normally 2 hours per each hour of instruction. Exceptions to this arrangement may be made in cases where specific classification is not feasible.

**How are Grade-point averages computed?**

For example, suppose grades for the Quarter are:

| Subject | Grade | Qtr. Hours Credit |
|---|---|---|
| T ENG 102 | 94 or A | 3 |
| T MAT 102 | 87 or B | 5 |
| T BUS 120 | 76 or D | 4 |
| T ECO 104 | 83 or C | 3 |
| T BUS 115 | 78 or C | 3 |
| | | 18 |

The grade for each subject will be converted to a grade-point (see conversion in table above). Then the grade-point is multiplied by

the quarter hours. The result (Total quality points) is then divided by the total quarter hours credit to give the grade-point average.

Example:

| Class | Grade Point | | Qtr. Hours Credit | | Quality Points |
|---|---|---|---|---|---|
| T ENG 102 | 4 | × | 3 | = | 12 |
| T MAT 102 | 3 | × | 5 | = | 15 |
| T BUS 120 | 1 | × | 4 | = | 4 |
| T ECO 104 | 2 | × | 3 | = | 6 |
| T BUS 115 | 2 | × | 3 | = | 6 |
| | TOTALS | | 18 | | 43 |

Divide 43 ÷ 18 = 2.39

The grade point average is 2.39.

## TRANSCRIPT OF RECORDS

Upon request of the student, transcripts of credit earned at Cape Fear Technical Institute will be sent to other schools and/or industry. There is no charge for this service.

## REQUIREMENTS FOR GRADUATION

To receive the Associate in Applied Science Degree, a student must maintain satisfactory grades in all laboratory and class subjects and an overall grade point average of 2.0.

To receive a diploma, a student must have a satisfactory passing grade in all shop work and related class subjects. A student must be in residence for at least one quarter to be eligible for graduation.

## GRADUATION WITH HONORS

Those members of the graduating class who have demonstrated outstanding leadership, attitude and ability will be graduated with honors. Scholarship is not the only factor in graduating with honors. Recipients of these awards are selected by Department Heads in Cooperation with appropriate faculty members.

## SCHOLASTIC HONORS

Full-time students who have earned a grade point average of 3.0 with no grade lower than "C" will be placed on the Dean's List.

## CONDUCT

Students will have but one conduct rule, i.e., to conduct themselves as ladies and gentlemen. This has reference to dress, speech and action. Area or classroom rules will be designated by instructors or supervisors and must be followed by all.

## ATTENDANCE AND TARDINESS

The nature of the programs for students at Cape Fear Technical Institute is such that it is necessary that students be in regular attendance at all times.

When a student completes his course of study at this school, he usually goes directly into industry which requires that he be in regular attendance at all times.

Instructors are responsible for keeping attendance records on all students that attend their classes. An instructor should refer a student to the Studen Affairs Office for counseling when his attendance is such that it is affecting the student's grades.

In the case of excessive absences, the instructor may deny credit for the course or recommend that the student be dropped from that course. A student should be absent for emergency reasons only.

A student should be dropped not later than the fifth unexcused absence. In some cases he may be dropped earlier if notification is made by the Student Affairs Office. A student that has missed five days may be readmitted by the Dean of Student Affairs Office only.

A student is tardy if not in his classroom, lab, or shop five minutes after classes change. If a student accumulates three tardies in a class, the instructor may count these tardies as one of the emergency absences. A student who is fifteen or more minutes late for a class, or who leaves before the class is over without the instructor's permission, will be counted as having an emergency absence from that class. Students will be informed as to the times allotted for breaks between class or lab at the beginning of the quarter; this time limit should be strictly followed to avert penalty.

## DRESS

Where special dress or safety devices are required by the instructor, Department of Community College regulations, public law, Dean of Student Affairs, or the President, the student will be expected to conform. Shorts may not be worn to classes within the institute buildings and shoes must be worn at all times in the buildings and on the ships. Students are expected to maintain good personal grooming consistent with the ordinary requirements of industry. Male students will be required to have haircuts insuring meeting good sanitation and safety procedures.

## PROBATION AND SUSPENSION

A student failing to make or maintain an accumulative grade point average of 1.5 during any quarter will be subject to academic probation for the following quarter. A probationary student who

fails to raise his accumulative grade point average to 1.50 is subject to academic suspension or placement in a more appropriate program. A student suspended for poor scholarship must have his case reviewed by the Dean of Student Affairs and Admissions Committee before being re-admitted.

Any student whose conduct bcomes unsatisfactory will be placed on probation—any misconduct after a person is placed on probation will result in prompt suspension.

Absences of five or more consecutive days without notification to the Student Affairs Office will result in the student being dropped from the class roll. The student may be readmitted only by the Admissions and Student Personnel Advisory Committee through the Student Affairs Office.

## RIGHT OF APPEAL

Any student who is dismissed from school for academic or disciplinary reasons may have his case reviewed by requesting such through the Dean of Student Affairs who in turn will bring his case before the administration. The appeal may be carried to the Board of Trustees at the student's request.

## WITHDRAWAL

Students desiring to withdraw from school should contact the office of Student Affairs to obtain the necessary forms and procedures for official withdrawal. A student who fails to withdraw officially will receive a grade of "E" for each course in which enrolled.

In cases where former students desire to re-enter the school they must contact the Admissions Office who will reveiew their records and present their application to the admissions committee for approval.

## PLACEMENT

The Placement Officer, Dean of Student Affairs and Staff at Cape Fear Technical Institute make every possible effort to assist students and graduates in securing positions in their chosen fields. Although the Institute cannot guarantee placement, contact is maintained with business and industry concerning employment opportunities for students at Cape Fear Technical Institute.

There is no charge to industry or students for this placement service.

## HOUSING

The Institute does not have housing facilities, but students have had no difficulty in locating satisfactory housing quarters. Some places provide room and board at moderate rates. School

officials will assist students in finding housing, but cannot assume responibility beyond this. Students and landlords should have a complete understanding with regard to rental conditions, so that there will be no misunderstanding concerning such details.

## STUDENT ACTIVITIES

Extra-curricular activities are a very important part of the total educational program at Cape Fear Technical Institute.

Among the intercollegiate activities offered are basketball, baseball, and golf.

Intramural activities offered by the school are; volleyball, touch football, chess, and table tennis.

The student government is a very active organization at this school. It is the voice of the student body and has paved the way for good lines of communication between the students and the administration.

The student newspaper, student handbook, and school annual are among the publications done by the students. Students interested in any aspect of such publications are encouraged to participate.

Many students attending CFTI donate their time and energies to Institute projects under the guidance of instructors and community leaders by participating in some type of service club. Service clubs available to students are: Chess Club, Dive Club, Future Secretaries Club, and Veterans Club.

## HEALTH SERVICES

Health Services provided at this school are: (1) First aid and emergency care is available on campus. (2) Individual health counseling is made available. (3) Referrals for illness and injury that cannot be taken care of by individuals concerned are made to community health facilities. In case of illness or injury requiring transportation, the Student Affairs Office should be contacted immediately.

## VETERANS SERVICES

This Institute has reaffirmed its commitment to Veterans by the establishment of a full time Veterans Affairs Office. The Veterans Affairs Office is staffed to provide services at times and places convenient to the veterans being served. Veterans attending this school are encouraged to use the services provided by this office.

## ALUMNI

Efforts to keep Alumni of the school informed about what is going on are made by bi-annual newsletters. Former students are encouraged to become active in alumni activities.

# TECHNICAL CURRICULA

## TECHNICAL PROGRAMS

Technicians are among the fastest growing occupational groups in the United States. In recent years, the needs of an expanding and increasingly-technical economy have greatly intensified the demand not only for engineers and scientists, but also for the technical workers who assist them. Technicians are those workers whose jobs require both knowledge and use of scientific and mathematical theory; specialized education or training in some aspect of technology or science; and who, as a rule, work directly with scientists and engineers. Some jobs held by these technicians are supervisory and require both technical knowledge and the ability to supervise people.

In carrying out their assignments, engineering and science technicians frequently use complex electronic and mechanical instruments, experimental laboratory apparatus, and drafting instruments. These workers engage in virtually every aspect of engineering and scientific work. In research, development, and design work, they conduct experiments or tests; set up, calibrate, and operate instruments; and make calculations. They also assist scientists and engineers in developing experimental equipment and models by making drawings and sketches and frequently do some design work.

Technicians also work in jobs related to production and may aid in the various phases of production operations, such as working out specifications for materials and methods of manufacture, advising tests to insure quality control of products, or making time-and-motion studies (timing and analyzing the worker's movements) designed to improve the efficiency of a particular operation. They may also perform liaison work between engineering and production or other departments.

The Cape Fear Technical Institute provides training in a number of areas which require training beyond the high school but which do not require four years of college preparation. Most of the technical programs are eighteen months in length and are geared to train a person in specific technical areas. Students spend twenty to thirty hours per week in classroom and laboratory work; additional time will be needed for outside assignments.

Credit hours granted in the various technical programs are not transferable to other institutions except as an institution may determine that a particular course and credits are applicable to a curriculum offered by that school.

The associate in applied science degree is awarded to students who complete a technical program. To be eligible for the degree, a student must maintain satisfactory grades in all laboratory and class subjects and an overall grade point average of 2.0.

## COURSES OFFERED

Business Administration

Drafting & Design Technology

Electronics Technology

General Office Technology

General Occupational Technology

Instrumentation Technology

Manufacturing Process Control Technology (Chemical Tech)

Marine Construction Engineering Technology

Marine Electronics (Special Technology, one quarter only)

Marine Laboratory Technology

Marine Technology

Secretarial-Engineering and Technical

## ADMISSION REQUIREMENTS

1. Must be at least eighteen years of age, or his high school class must have graduated.

2. Must be a high school graduate or equivalent*.

3. Must demonstrate aptitude for technician training as determined by standard tests. These tests will aid in student selection, placement, and guidance. Guidance and counseling will be available to the student throughout his education, not just at the time of his enrollment.

4. Must complete medical form provided by Institute.

5. A personal interview is required.

## ADMISSION PROCEDURE

1. Submit completed application.

2. Have transcripts of all previous education mailed to the Institute.

3. Must take placement test.

4. Come to the school for a personal interview and additional testing when asked to do so.

5. Submit medical form to the Institute.

*See page 186 in General Adult Education Section of this catalogue for details about the high school equivalency certificate.

## BUSINESS ADMINISTRATION

In North Carolina the opportunities in business are increasing. With the increasing population and industrial development in this State, business has become more competitive and automated. Better opportunities in business will be filled by students with specialized education beyond the high school level. The Business Administration Curriculum is designed to prepare the student for employment in one of many occupations common to business. Training is aimed at preparing the student in many phases of administrative work that might be encountered in the average business.

The specific objectives of the Business Administration Curriculum are to develop the following competencies:

1. Understanding of the principles of organization and management in business operations.

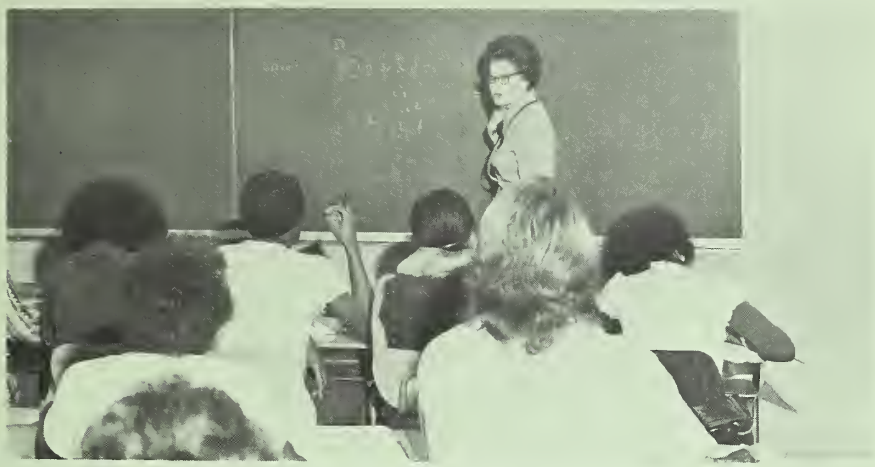
2. Understanding our economy through study and analysis of the role of production and marketing.

3. Knowledge in specific elements of accounting, finance, and business law.

4. Understanding and skill in effective communication for business.

5. Knowledge of human relations as they apply to successful business operations in a rapidly expanding economy.

The graduate of the Business Administration Curriculum may enter a variety of career opportunities from beginning sales person or office clerk to manager trainee. The duties and responsibilities of this graduate vary in different firms. These encompassments might include: making up and filing reports, tabulating and posting data in various books, sending out bills, checking calculations, adjusting complaints, operating various office machines, and assisting managers in supervising. Positions are available in businesses such as advertising; banking; credit; finance; retailing; wholesaling; hotel, tourist, and travel industry; insurance; transportation; and communications.



## BUSINESS ADMINISTRATION

| | | Hours Per Week | | | |
|---|---|---|---|---|---|
| FIRST QUARTER | | Class | Lab | Manipulative Lab | Quarter Hours Credit |
| T-ENG | 101-C—Grammar and Composition | 3 | 2 | 0 | 4 |
| T-BUS | 102—Typewriting (or Elective) | 2 | 0 | 3 | 3 |
| T-MAT | 110—Business Mathematics | 5 | 0 | 0 | 5 |
| T-BUS | 101—Introduction to Business | 5 | 0 | 0 | 5 |
| T-ECO | 102—Economics | 3 | 0 | 0 | 3 |
| | | 18 | 2 | 3 | 20 |
| SECOND QUARTER | | | | | |
| T-ENG | 102-C—Grammar and Composition | 3 | 2 | 0 | 4 |
| T-BUS | 120—Accounting | 5 | 2 | 0 | 6 |
| T-ECO | 104—Economics | 3 | 0 | 0 | 3 |
| T-BUS | 103—Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 115-C—Business Law | 5 | 0 | 0 | 5 |
| | | 18 | 4 | 3 | 21 |
| THIRD QUARTER | | | | | |
| T-ENG | 104—Reading and Composition | 3 | 0 | 0 | 3 |
| T-BUS | 110-C—Office Machines | 1 | 2 | 0 | 2 |
| T-BUS | 121—Accounting | 5 | 2 | 0 | 6 |
| T-BUS | 116-C—Business Law | 5 | 0 | 0 | 5 |
| T-BUS | 104—Typewriting | 2 | 0 | 3 | 3 |
| | | 16 | 4 | 3 | 19 |
| FOURTH QUARTER | | | | | |
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| T-EDP | 104—Introduction to Data Processing Systems | 3 | 2 | 0 | 4 |
| T-BUS | 122—Accounting | 5 | 2 | 0 | 6 |
| T-BUS | 243—Advertising | 3 | 2 | 0 | 4 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| | | 17 | 6 | 0 | 20 |

FIFTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-ENG | 206—Business Communication | 3 | 0 | 0 | 3 |
| T-BUS | 123-C—Business Finance | 3 | 2 | 0 | 4 |
| T-BUS | 232-C—Sales Development | 3 | 2 | 0 | 4 |
| T-BUS | 229—Taxes | 3 | 2 | 0 | 4 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| | | 15 | 6 | 0 | 18 |

SIXTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-BUS | 124-C—Business Finance | 3 | 2 | 0 | 4 |
| T-BUS | 220-C—Managerial Accounting | 5 | 2 | 0 | 6 |
| T-BUS | 239—Marketing | 5 | 0 | 0 | 5 |
| T-BUS | 271C—Office Management and Supervision | 3 | 2 | 0 | 4 |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| | | 19 | 6 | 0 | 22 |

## BUSINESS ADMINISTRATION

### COURSE DESCRIPTIONS BY QUARTERS

FIRST QUARTER

T-Eng 101-C—Grammar and Composition: Designed to aid the student in the improvement of self-expression in both writing and speaking. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English, grammar and written composition in their day to day situations.

Prerequisite: None

T-Bus 102—Typewriting: Introduction to the touch typewriting system with emphasis on correct techniques, mastery of the keyboard, simple business correspondence, tabulation, and manuscripts. Minimum speed requirement—15 gross words a minute with 5 errors allowed.

Prerequisite: None

T-Mat 110—Business Mathematics: This course stresses the fundamental operations and their application to business problems. Topics covered include payrolls, price marking, interest and discount, commission, taxes, and pertinent uses of mathematics in the field of business.

Prerequisite: None

T-Bus 101—Introduction to Business: A survey of the business world with particular attention devoted to the structure of the various types of business organization, methods of financing, internal organization, and management.

Prerequisite: None

T-Eco 102—Economics: The fundamental principles of economics including the institutions and practices by which people gain a livelihood. Included is a study of the laws of supply and demand and the principles bearing upon production, exchange, distribution, and consumption both in relation to the individual enterprise and to society at large.

Prerequisite: None

SECOND QUARTER

T-Eng 102-C—Grammar and Composition: In this continuation of T-Eng 101-C, emphasis is placed on advanced grammar and diction and the application of these in compositional work culminating in a term paper.

Prerequisite: T-End 101-C

**T-Bus 120—Accounting:** Principles, techniques and tools of accounting, for understanding of the mechanics of accounting. Collecting, summarizing, analyzing, and reporting information about service and mercantile enterprises, to include practical application of the principles learned.

Prerequisite: T-Mat 110

**T-Eco 104—Economics:** Greater depth in principles of economics, including a penetration into the composition and pricing of national output, distribution of income, international trade and finance, and current economic problems.

Prerequisite: T-Eco 102

**T-Bus 103—Typewriting:** Instruction emphasizes the development of speed and accuracy with further mastery of correct typewriting techniques. These skills and techniques are applied in tabulation, manuscript, correspondence, and business forms. Minimum speed requirement—25 gross words a minute with 5 errors allowed.

Prerequisite: T-Bus 102 or equivalent

**T-Bus 115-C—Business Law:** A general course designed to acquaint the student with certain fundamentals and principles of business law, including contracts, negotiable instruments, and agencies.

Prerequisite: None

## THIRD QUARTER

**T-Eng 104—Reading and Composition:** Advances the student's compositional skills learned in 102 (Grammar and Composition) by combining them with reading. After an introduction to reading mechanics, the student reacts to ideas encountered in various fiction and non-fiction materials.

Prerequisite: T-Eng 102-C

**T-Bus 110-C—Office Machines:** A general survey of the business and office machines. Students will receive training in techniques, processes, operation and application of the ten-key adding machine, full keyboard adding machines, and calculator.

Prerequisite: None

**T-Bus 121—Accounting:** Partnership and corporation accounting including a study of payrolls, federal and state taxes. Emphasis is placed on the recording, summarizing and interpreting data for management control rather than on bookkeeping skills. Accounting services are shown as they contribute to the recognition and solution of management problems.

Prerequisite: T-Bus 120

**T-Bus 116-C—Business Law:** Includes the study of laws pertaining to bailments, sales, riskbearing, partnership-corporation, mortgages, and property rights.

Prerequisite: T-Bus 115-C

**T-Bus 104—Intermediate Typewriting:** Emphasis on production typing problems and speed building. Attention to the development of the student's ability to function as an expert typist, producing mailable copies. The production units are tabulation, manuscript, correspondence and business forms. Minimum speed requirement—35 gross words a minute with 4 errors allowed.

Prerequisite: T-Bus 103 or equivalent

## FOURTH QUARTER

**T-Eng 204—Oral Communication:** A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement

in interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

T-Edp 104—Introduction to Data Processing Systems: Fundamental concepts and operational principles of data processing systems, as an aid in developing a basic knowledge of computers, prerequisite to the detail study of particular computer problems.
Prerequisite: None

T-Bus 122—Accounting: Advanced practice problems in accounting. Emphasis on detailed and accurate interpretation of data for management.
Prerequisite: T-Bus 121

T-Bus 243—Advertising: The role of advertising in a free economy and its place in the media of mass communications. A study of advertising appeals; product and market research; selection of media; means of testing effectiveness of advertising. Theory and practice of writing advertising copy for various media.
Prerequisite: None

T-Psy 206-C—Applied Psychology: A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None

## FIFTH QUARTER

T-Eng 206—Business Communication: Develops skills in techniques of writing business communications. Emphasis is placed on writing action in such situations as sales, applications, orders, letters involving credit, collections, adjustments, and inquiry.
Prerequisite: T-Eng 102-C

T-Bus 123-C—Business Finance: Financing of business units, as individuals, partnerships, corporations, and trusts. A detailed study is made of short-term, long-term, and consumer financing.
Prerequisite: None

T-Bus 232-C—Sales Development: A study of retail, wholesale and specialty selling. Emphasis is placed upon mastering and applying the fundamentals of selling. Preparation for and execution of sales demonstrations required.
Prerequisite: None

T-Bus 229—Taxes: Application of federal and state taxes to various businesses and business conditions. A study of the following taxes: income, payroll, intangible, capital gain, sales and use, excise, and inheritance.
Prerequisite: T-Bus 121

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effect of social life on human personality and behavior.
Prerequisite: None

## SIXTH QUARTER

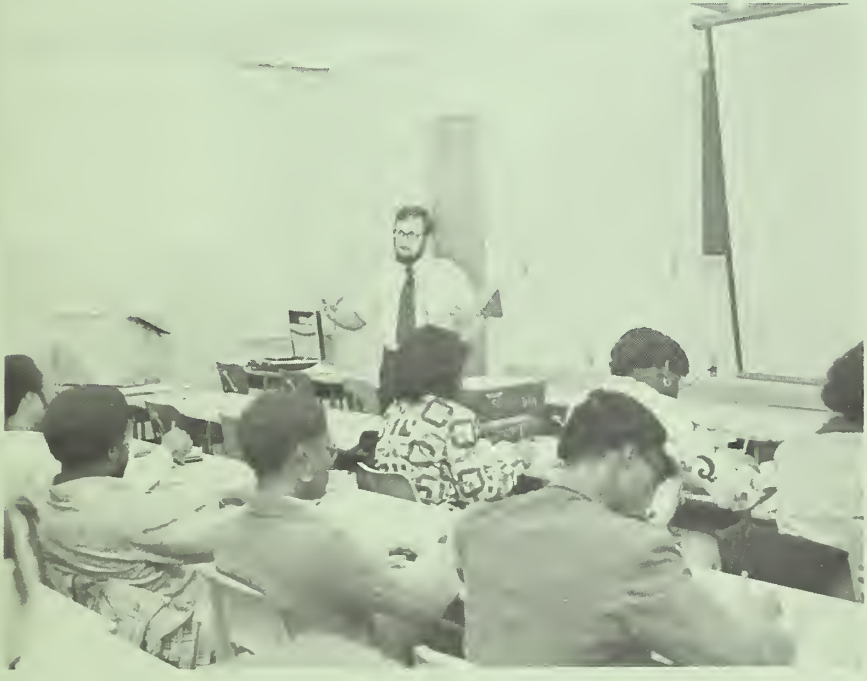
**T-Bus 124-C—Business Finance:** Financing, federal, state, and local governments and the ensuing effects upon the economy. Factors affecting supply of funds, monetary and credit policies.
Prerequisite: T-Bus 123-C

**T-Bus 220—Managerial Accounting:** Emphasizes the analysis of accounting data. Accounting data are evaluated as to usefulness in predicting the risks involved in management decisions. Problem situations that require the analysis of the effectiveness of accounting information get the student totally involved with major management concepts.
Prerequisite: T-Bus 121

**T-Bus 239—Marketing:** A study of the marketing structure within the framework of the U. S. economic system. It includes the study of the movement of goods from producer to consumer through various channels of distribution, the functions of marketing, the social and economic implications.
Prerequisite: None

**T-Bus 271-C—Office Management and Supervision:** Presents the fundamentals of office management, including office automation, planning, controlling, and organizing. Emphasis is placed on securing an effective work force and the role of the supervisor.
Prerequisite: None

**T-Soc 206—American Institutions:** A study of the effect of American social, economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.
Prerequisite: None



## DRAFTING & DESIGN — MECHANICAL

This curriculum description was prepared for the purpose of outlining a training program for students of mechanical drafting and design technology. There are certain identifiable duties which are common to all technicians of this general classification and which comprise the basic areas of technical knowledge they need. This curriculum has been designed for training persons in the accepted performance of these basic duties that will be assigned, and to enable the individual student to become proficient in a short time after he becomes employed in the industry.

Courses in general education have been included to give a student the assurance and understanding that comes with education upon a broad base. The technician associates with many levels of thought and expression — administrative, personnel, scientists, engineers, skilled workmen—and must be able to communicate effectively with all levels. Courses containing essential information from related subject areas, such as mathematics, physics, and mechanics have been included in order to provide the student a better academic base for his training. Emphasis is placed upon ability to think and plan, as well as drafting procedures and techniques.

Mechanical drafting and design technicians are concerned with the preparation of drawings for design proposals, for experimental models and items for production for use.

These technicians perform many aspects of drafting in a specialized field, such as the developing of the drawing of a section, subassembly or major component. Investigating design factors and availability of material and equipment, production methods and facilities are frequent assignments. They assist in the design of existing units and reports on functional performance. They may draw components in industrial fields based on engineers' original design concepts or specific ideas. Also, they may be assigned as coordinators for the execution of related work or other design, production, tooling, material and planning groups. Technicians with experience in this classification may often supervise the preparation of working drawings.

These technicians are employed in many types of manufacturing, fabrication, research development and service industries. Substantial numbers also are employed in communications, transportation, public utilities, consulting engineering firms, and federal, state, and local governments.

## DRAFTING & DESIGN — MECHANICAL

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | **Class** | **Lab** | **Shop** | **Credit** |
| T-ENG | 101—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MAT | 101-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-DFT | 101-C—Technical Drafting | 3 | 0 | 9 | 6 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| | | 14 | 0 | 9 | 17 |
| **SECOND QUARTER** | | | | | |
| T-ENG | 102—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MAT | 102-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-DFT | 102-C—Technical Drafting | 0 | 0 | 9 | 3 |
| T-BUS | 102—Typewriting | 2 | 0 | 3 | 3 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| | | 13 | 0 | 12 | 17 |
| **THIRD QUARTER** | | | | | |
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| T-MAT | 103-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-PHY | 101—Physics: Properties of Matter | 3 | 2 | 0 | 4 |
| T-DFT | 103—Technical Drafting | 0 | 0 | 6 | 2 |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| T-MAT | 109—Slide Rule | 3 | 0 | 0 | 3 |
| | | 17 | 2 | 6 | 20 |
| **FOURTH QUARTER** | | | | | |
| T-ENG | 103—Report Writing | 3 | 0 | 0 | 3 |
| T-DFT | 201—Technical Drafting | 3 | 0 | 6 | 5 |
| T-PHY | 102—Physics: Work, Energy, Power | 3 | 2 | 0 | 4 |
| T-MEC | 216—Industrial Materials | 5 | 0 | 0 | 5 |
| T-MEC | 101—Machine Processes | 0 | 4 | 0 | 2 |
| | | 14 | 6 | 6 | 19 |

| FIFTH QUARTER | Class | Hours Per Week Lab | Shop | Quarter Hours Credit |
|---|---|---|---|---|
| T-DFT 208—Introduction to Architectural Drafting | 2 | 0 | 6 | 4 |
| T-PHY 106—Applied Mechanics | 3 | 0 | 3 | 4 |
| T-MEC 209-C—Introduction to Metallurgy | 5 | 0 | 0 | 5 |
| T-WLD 101—Welding | 0 | 0 | 3 | 1 |
| T-MEC 102—Machine Processes | 0 | 4 | 0 | 2 |
| | 10 | 4 | 12 | 16 |
| **SIXTH QUARTER** | | | | |
| T-DFT 206—Design Drafting II | 4 | 0 | 9 | 7 |
| T-MEC 235-C—Hydraulics and Pneumatics | 3 | 0 | 3 | 4 |
| T-DFT 211—Mechanisms | 3 | 2 | 0 | 4 |
| T-MEC 205—Strength of Materials | 2 | 0 | 0 | 2 |
| | 12 | 2 | 12 | 17 |

## DRAFTING & DESIGN MECHANICAL

### COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

T-Eng 101—Grammar and Composition: This course is designed as a review of the elements of grammar. Exercises involve parts of speech, sentences, punctuation and mechanics, usage and style, spelling, and composition.

Prerequisite: None

T-Mat 101-C—Technical Mathematics: The general area of basic mathematical concepts is presented, including common and decimal fractions, squares and square roots. The essential elements of algebra are also presented, including: positive and negative numbers, algebraic terminology, polynomials, exponents, scientific notation and powers of 10, grouping symbols, first degree and literal equations. Use of the slide rule is introduced at the beginning of this course. The application of principles learned is stressed in practical problems.

Prerequisite: None

T-Dft 101-C—Technical Drafting: The field of drafting is introduced as the student begins study of drawing principles and practices for print reading and describing objects in the graphic language. Basic skills and techniques of drafting included are: use of drafting equipment, lettering, freehand orthographic and pictorial sketching, geometric construction, orthographic instrument drawing of principal views, and standards and practices of dimensioning. The principles of isometric drawings are introduced. Problems involving points, lines, and planes shall be studied.

Prerequisite: None

T-Psy 206-C—Applied Psychology: A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.

Prerequisite: None

## SECOND QUARTER

**T-Eng 102—Grammar and Composition:** This course is designed to orient students in using a library, learning to use the dictionary, and preparing the term paper. Attention is given to acquaintanceship with magazines and other publications. Writing assignments are frequent.
Prerequisite: T-Eng 101

**T-Mat 102-C—Technical Mathematics:** This is a continuation of T-Mat 101-C. Numerical trigonometry is introduced in this course and includes right triangles and radian measure of angles. A working knowledge of numerical computations is acquired, utilizing logarithms in conjunction with the slide rule. Linear graphs, simultaneous equations and determinants are also introduced.
Prerequisite: T-Mat 101-C

**T-Dft 102-C—Technical Drafting:** Intersection and developments and their practical solutions. Where applicable, model solutions accompany the problems. Architectural drawing will be introduced.
Prerequisite: T-Dft 101-C

**T-Bus 102—Typewriting:** Introduction to the touch typewriting system with emphasis on correct techniques, mastery of the keyboard, simple business correspondence, tabulation, and manuscripts.
Prerequisite: None

**T-Soc 102-C—Principles of Sociology:** An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effects of social life on human personality and behavior.
Prerequisite: None

## THIRD QUARTER

**T-Eng 204—Oral Communication:** A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement in interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

**T-Mat 103-C—Technical Mathematics:** This is a continuation of T-Mat 102-C. More advanced algebraic subjects are presented, including: Special products, factoring, algebraic fractions, exponents and radicals, vector and phasor algebra, quadratic equations, graphs of quadratics, maximum and minimum, and imaginary numbers. Measurements and computations involving areas and volumes of regular figures and solids are introduced as well as trigonometric functions of oblique triangles.
Prerequisite: T-Mat 102-C

**T-Phy 101—Physics: Properties of Matter:** A fundamental course covering several basic principles of physics. The divisions included are solids and their characteristics, liquids at rest and in motion, gas laws and applications. Laboratory experiments and specialized problems dealing with these topics are part of this course.
Prerequisite: None

**T-Dft 103—Technical Drafting:** The application of orthographic projection principles to the more complex drafting problems, primary and secondary auxiliary views, simple and successive revolutions, and sections and conventions will be studied. Dimensioning practices for "details" and "working drawings," approved by the American Standards Association will also be included. Screws, screw threads, springs, keys, rivets will be covered.
Prerequisite: T-Dft 102-C

T-Soc 206—American Institutions: A study of the effect of American social. economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.
Prerequisite: None

T-Mat 109—Slide Rule: An introductory slide rule course starting with multiplication and division going into more complicated mathematics. Students will also master the use of a slide rule in calculating squares and square roots, reciprocals and trigonometric functions.
Prerequisite: None

FOURTH QUARTER

T-Eng 103—Report Writing: The fundamentals of English are utilized as a background for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.
Prerequisite: None

T-Dft 201—Technical Drafting: Basic mechanisms of motion transfer, gears and cams, will be studied and drawn with emphasis on methods of specifying, calculating, dimensions, and delineating.
Prerequisite: T-Dft 103

T-Phy 102—Physics: Work, Energy, Power: Major areas covered in this course are work, energy, and power. Instruction includes such topics as statics, forces, center of gravity and dynamics. Units of measurement and their applications are a vital part of this course. A practical approach is used in teaching students the use of essential mathematical formulas.
Prerequisites: T-Phy 101, T-Mat 101-C

T-Mec 216—Industrial Materials: Proper knowledge of all types of industrial materials is essential to successful decision-making and problem solving. This introductory course investigates the basic materials in industry. Electrical and physical properties of materials, mechanical characteristics of materials, water and steam, industrial gases, ceramic materials, cements and concretes, and metals are studied.
Prerequisite: None

T-Mec 101—Machine Processes: An introductory course designed to acquaint the student with basic hand tools, safety procedures and machine processes of modern industry. It will include a study of measuring instruments, characteristics of metals and cutting tools. The student will become familiar with the lathe family of machine tools by performing selected operations such as turning, facing, threading, drilling, boring, and reaming.
Prerequisite: None

FIFTH QUARTER

T-Dft 208—Introduction to Architectural Drafting—Introduction to basic principles of architectural drawings. Included are floor plans, elevations, wall sections, details, site plans, electrical plan, plumbing plan, heating plan, and foundation plans. Following this information, the course will introduce model making as a media for study and visualization of architectural and engineering concepts.
Prerequisite: T-Dft 201

T-Phy 106—Applied Mechanics: Concepts and principles of statics and dynamics. Parallel concurrent and noncurrent force systems in coplanar and non-

coplanar situations. Concepts of centroids and center of gravity, moments of inertia, fundamentals of kinetics, and kinematics of velocity and motion.
Prerequisites: T-Mat 103-C, T-Phy 102

T-Mec 209-C—Introduction to Metallurgy. An introductory course investigating the properties of ferrous and non-ferrous metals and the tests to determine their uses. Production of iron and steel, shaping and forming, physical metallurgy of ferrous metals, heat treatments of steel, surface treatments, alloys of steel, and cast iron will be topics for study. Non-ferrous metals such as bearings metals (lead, brass, bronze), light metals (aluminum and magnesium), and copper and its alloys will be studied.
Prerequisite: None

T-Wld 101—Welding: Familiarization with the various Welding techniques and processes will be taught. These will include Oxyacetylene Welding, Arc Welding, Mig Welding, and Tig Welding.
Prerequisite: None

T-Mec 102—Machine Processes: Advanced operations on lathe, drilling, boring and reaming machines. Milling machine theory and practice. Thorough study of the types of milling machines, cutters, jig and fixtures devices, and the accessories used in a modern industrial plant. Safety in the operational shop is stressed.
Prerequisite: T-Mec 101

## SIXTH QUARTER

T-Dft 206—Design Drafting II: Research to solve a problem in design by consulting various manuals, periodicals, and through laboratory experiments. A written technical report, preliminary design sketches, layout drawings, detail drawings, assembly and sub-assembly drawings, pictorial drawings, exploded pictorial assembly, patent drawings and specifications are required as a part of the problem
Prerequisite: T-Dft 201

T-Mec 235-C—Hydraulics and Pneumatics: In this course the student will learn the basic ideas of hydraulic and pneumatic systems. In so doing the student will develop an understanding of various hydraulic and pneumatic controls and their relationships and function in circuits. Symbols and conventional practices will be stressed.
Prerequisite: T-Phy 102 or T-Phy 105

T-Dft 211—Mechanisms: Mathematical and drafting room solutions of problems involving the principles of machine elements. Study of motions of linkages, velocities and acceleration of points within a link mechanism; layout methods for designing cams, belt, pulleys, gears and gear trains.
Prerequisites: T-Dft 201, T-Mat 102-C, T-Phy 106

T-Mec 205—Strength of Materials: Instruction to the principles and analysis of stresses which occur within machine and structure elements subjected to various types of loads such as static, impact, varying and dynamic. Discussions of these stresses are made as applied to thin-walled cylinders and spheres, riveted and welded joints, beams, columns and machine components.
Prerequisites: T-Phy 106, T-Mat 103-C

## ELECTRONICS TECHNOLOGY

The field of electronics has developed at a rapid pace since the turn of the century. For many years the major concern of electronics was in the area of communications. Developments during World War II and in the period since have revolutionized production techniques. New industries have been established to supplement the need and demand for electronics equipment.

Many opportunities exist for men and women with a technical education in electronics. This curriculum provides a basic background in electronic related theory with practical applications of electronics for business and industry. Courses are designed to develop competent electronics technicians who may take their place as an assistant to an engineer, or as a liaison between the engineer and the skilled craftsman.

The electronics technician may start in one or more of the following areas: research, design, development, production, maintenance or sales. He may be an assistant to an engineer, an engineering aide, laboratory technician, supervisor or equipment specialist. His training is similar to that of an engineer, but in less depth and more practical in application.

## ELECTRONICS TECHNOLOGY

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| T-ENG | 101—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MAT | 101-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 111—Applied Mathematics for Electronics | 5 | 0 | 0 | 5 |
| T-ELC | 107—Electricity I | 4 | 0 | 3 | 5 |
| T-ELN | 106—Electronics I (Instrument Familiarization) | 2 | 0 | 6 | 4 |
| | | 19 | 0 | 9 | 22 |
| **SECOND QUARTER** | | | | | |
| T-ENG | 102—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MAT | 102-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 112—Applied Mathematics for Electronics | 3 | 0 | 0 | 3 |
| T-ELC | 108—Electricity II | 4 | 0 | 3 | 5 |
| T-ELN | 107—Electronics II (Semiconductor Diodes & Vacuum Tubes) | 5 | 0 | 6 | 7 |
| | | 20 | 0 | 9 | 23 |
| **THIRD QUARTER** | | | | | |
| T-ENG | 103—Report Writing | 3 | 0 | 0 | 3 |
| T-MAT | 103-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 113—Applied Mathematics for Electronics | 3 | 0 | 0 | 3 |
| T-ELC | 109—Electricity III | 4 | 0 | 3 | 5 |
| T-ELN | 108—Electronics III (Transistors) | 5 | 0 | 3 | 6 |
| T-DFT | 101—Technical Drafting | 1 | 0 | 3 | 2 |
| | | 21 | 0 | 9 | 24 |
| **FOURTH QUARTER** | | | | | |
| T-ELN | 205—Applications of Vacuum Tubes and Transistors | 4 | 0 | 3 | 5 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| T-ELN | 213—Pulse Circuit Analysis | 2 | 0 | 3 | 3 |
| T-ELN | 229—Electronic Project | 2 | 0 | 3 | 3 |
| T-ELN | 232—F. C. C. License Preparation I | 4 | 0 | 0 | 4 |
| | | 15 | 0 | 9 | 18 |
| **FIFTH QUARTER** | | | | | |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| T-ELN | 230—Electronic Project | 3 | 0 | 3 | 4 |
| T-ELN | 238—Antenna and Transmission Line Theory | 2 | 2 | 0 | 3 |
| T-ELN | 241—Digital Principles and Applications | 4 | 0 | 6 | 6 |
| | | 15 | 2 | 9 | 19 |
| **SIXTH QUARTER** | | | | | |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| T-ELN | 220—Electronic Systems | 6 | 0 | 0 | 6 |
| T-ELN | 231—Electronic Project | 3 | 0 | 3 | 4 |
| T-ELN | 233—F. C. C. License Preparation II | 6 | 0 | 0 | 6 |
| T-BUS | 272—Principles of Supervision | 3 | 0 | 0 | 3 |
| | | 21 | 0 | 3 | 22 |

# ELECTRONICS TECHNOLOGY

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

**T-Eng 101—Grammar and Composition:** This course is designed as a review of the elements of grammar. Exercises involve parts of speech, sentences, punctuation and mechanics, usage and style, spelling, and composition.
Prerequisite: None

**T-Mat 101-C—Technical Mathematics:** The general area of basic mathematical concepts is presented, including common and decimal fractions, squares and square roots. The essential elements of algebra are also presented, including: positive and negative numbers, algebraic terminology, polynomials, exponents, scientific notation and powers of 10, grouping symbols, first degree and literal equations. Use of the slide rule is introduced at the beginning of this course. The application of principles learned is stressed in practical problems.
Prerequisite: None

**T-Mat 111—Applied Mathematics for Electronics:** Designed to aid the student by mathematical applications of the basic and principles of electricity. Scientific notation, units and dimensions, and Ohm's Law regarding series and parallel DC circuits are studied.
Prerequisite: None

**T-Elc 107—Electricity I:** Introduction to basic theories and principles of electricity. Electrostatics, basic electric units, symbols, Ohm's Law, basic DC circuits, power, DC sources, and complex circuits are major parts of the course. Practical applications are stressed.
Prerequisite: None

**T-Eln 106—Electronics I:** Instrument familiarization. Functional use of the various test instruments used in the Electronics and Instrumentation fields.
Prerequisite: None

### SECOND QUARTER

**T-Eng 102—Grammar and Composition:** This course is designed to orient students in using a library, learning to use the dictionary, and preparing the term paper. Attention is given to acquaintanceship with magazines and other publications. Writing assignments are frequent.
Prerequisite: T-Eng 101

**T-Mat 102-C—Technical Mathematics:** This is a continuation of T-Mat 101-C. Numerical trigonometry is introduced in this course and includes right triangles and radian measure of angles. A working knowledge of numerical computations is acquired, utilizing logarithms in conjunction with the slide rule. Linear graphs, simultaneous equations and determinants are also introduced.
Prerequisite: T-Mat 101-C

**T-Mat 112—Applied Mathematics for Electronics:** This is a continuation of T-Mat 111. Mathematical applications are made to the study of resistivity, multipliers, alternating currents, induction, reactance, impedance, phase relations, and transformers.
Prerequisite: T-Mat 111 or Equivalent

**T-Elc 108—Electricity II:** A continuation of T-Elc 107. Introduction to meters, magnetism, alternating current theory covering simple generators, sine wave analysis, induction, reactance, impedance, phase relations, and transformers. Practical applications are stressed.
Prerequisite: T-Elc 107 or Equivalent

**T-Eln 107—Electronics II (Semiconductor Diodes and Vacuum Tubes):** A study of semiconductor diodes, including tunnel diodes, zener diodes, and light emitting diodes, also vacuum tube characteristics, circuit parameters of basic amplifiers. Filter circuits, RL, RC and RLC.
Prerequsites: T-Elc 107 and T-Eln 106

## THIRD QUARTER

**T-Eng 103—Report Writing:** The fundamentals of English are utilized as a background for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.
Prerequisite: None

**T-Mat 103-C—Technical Mathematics:** This is a continuation of T-Mat 102-C. More advanced algebraic subjects are presented, including: Special products, factoring, algebraic fractions, exponents and radicals, vector and phasor algebra, quadratic equations, graphs of quadratics, maximum and minimum, and imaginary numbers. Measurements and computations involving areas and volumes of regular figures and solids are introduced as well as trigonometric functions of oblique triangles.
Prerequisite: T-Mat 102-C

**T-Mat 113—Applied Mathematics for Electronics:** This is a continuation of T-Mat 112. Mathematical Applications are made to the study of capacitance, complex RCL circuits, resonance, filters and multiphase power.
Prerequisite: T-Mat 112 or Equivalent

**T-Elc 109—Electricity III:** A continuation of T-Elc 108. Introduction to capacitance, complex RCL circuits, resonance, filters and multiphase power. Practical applications are stressed.
Prerequisite: T-Elc 108 or Equivalent

**T-Eln 108—Electronics III (Transistors):** Theory & Applications of Transistor Circuits, Biasing, class of amplifiers, oscillators, multi-vibrators, coupling, push-pull and push-push amplifiers, and miscellaneous applications will be studied. Continued study of transducer theory and application.
Prerequisite: T-Elc 107

**T-Dft 101—Technical Drafting:** The field of drafting is introduced as the student begins study of drawing principles and practices for print reading and describing objects in the graphic language. Basic skills and techniques of drafting included are: use of drafting equipment, lettering, freehand orthographic and pictorial sketching, geometric construction, orthographic instrument drawing of principal views, and standards and practices of dimensioning.
Prerequisite: None

## FOURTH QUARTER

**T-Eln 205—Applications of Vacuum Tubes and Transistors:** Practical applications of vacuum tubes and transistors to basic audio amplifiers, radio frequency amplifiers, detectors, modulators and oscillators.
Prerequisite: T-Eln 107

**T-Psy 206-C—Applied Psychology:** A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None

T-Eln 213—Pulse Circuit Analysis: The study of wave-shaping circuits and their applications with emphasis on computer usage.
Prerequisite: T-Mat 113

T-Eln 229—Electronic Project: Construction, wiring and testing of functional electronic equipment. Develops wiring and trouble-shooting techniques. Selection to be approved by instructor.
Prerequisites: T-Eln 108 and T-Elc 109

T-Eln 232—F.C.C. License Preparation I (Laws and Regulations): A study of F.C.C. laws and regulations pertaining to the field of communications.
Prerequisite: None

FIFTH QUARTER

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relations and the efforts of social life on human personality and behavior.
Prerequisite: None

T-Eng 204—Oral Communication: A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement to interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

T-Eln 230—Electronic Project: Continuation of project T-Eln 229.
Prerequisite: T-Eln 229

T-Eln 238—Antenna and Transmission Line Theory: A study of antenna and transmission line theory. Methods of transferring radio frequency energy from its source to the antenna, antenna theory and radio wave propagation characteristics will be studied.
Prerequisite: T-Elc 109

T-Eln 241—Digital Principles & Applications: Basic computer concepts including: Binary and Octal numbers, binary codes, boolean algebra, arithmetic circuits, logic gates, flip-flops, input-out devices, memory devices, D/A and A/D converters.
Prerequisite: T-Eln 213

SIXTH QUARTER

T-Soc 206—American Institutions: A study of the effect of American social, economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.
Prerequisite: None

T-Eln 220—Electronic Systems: A block diagram course investigating numerous electronic systems. Modules or blocks of various circuits already studied are arranged in various manners to produce complex electronic systems. Systems will be explained and reduced to functions and then to block diagrams. AM, FM, and Single sideband transmitters and receivers, multiplexing, TV transmitters and receivers, pulse-modulated systems, computers, telemetry, navigational systems, sonar and radar will be considered.
Prerequisite: T-Eln 205

T-Eln 231—Electronic Project: Advanced continuation of T-Eln 230.
Prerequisite: T-Eln 230

**T-Eln 233—F.C.C. License Preparation II:** A study of various circuit configurations and theory of radios and transmitters as required for F.C.C. 2nd and 1st class license.

Prerequisite: T-Eln 232

**T-Bus 272—Principles of Supervision:** Introduces the basic responsibilities and duties of the supervisor and his relationship to superiors, subordinates, and associates. Emphasis on securing an effective work force and the role of the supervisor. Methods of supervision are stressed.

Prerequisite: None

## GENERAL OFFICE TECHNOLOGY

More people are now employed in clerical occupations than in any other single job category. Automation and increased production will mean that these people will need more technical skills and a greater adaptability for diversified types of jobs.

The General Office Occupations curriculum is designed to develop the necessary variety of skills for employment in the business world. Specialized training in skill areas is supplemented by related courses in mathematics, accounting, business law, and applied psychology.

The graduate of the General Office Occupations curriculum may be employed as an administrative assistant, accounting clerk, assistant office manager, bookkeeper, file clerk, or a variety of other clerical-related jobs. Positions are available in amost every type of business, large or small.

# GENERAL OFFICE TECHNOLOGY

| | | Hours Per Week | | | |
|---|---|---|---|---|---|
| | | Class | Lab | Manipulative Lab | Quarter Hours Credit |
| **FIRST QUARTER** | | | | | |
| T-ENG | 101-C—Grammar and Composition | 3 | 2 | 0 | 4 |
| T-BUS | 102—Typewriting (Or Elective) | 3 | 0 | 3 | 3 |
| T-MAT | 110—Business Mathematics | 5 | 0 | 0 | 5 |
| T-ECO | 102—Economics | 3 | 0 | 0 | 3 |
| T-BUS | 101—Introductions to Business | 5 | 0 | 0 | 5 |
| | | 18 | 2 | 3 | 20 |
| **SECOND QUARTER** | | | | | |
| T-ENG | 102-C—Grammar and Composition | 3 | 2 | 0 | 4 |
| T-BUS | 103—Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 115-C—Business Law | 5 | 0 | 0 | 5 |
| T-BUS | 120—Accounting | 5 | 2 | 0 | 6 |
| T-ECO | 104—Economics | 3 | 0 | 0 | 3 |
| | | 18 | 4 | 3 | 21 |
| **THIRD QUARTER** | | | | | |
| T-ENG | 104—Reading and Composition | 3 | 0 | 0 | 3 |
| T-BUS | 104—Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 121—Accounting | 5 | 2 | 0 | 6 |
| T-BUS | 183—Terminology and Vocabulary (Technical) | 3 | 0 | 0 | 3 |
| T-BUS | 110-C—Office Machines | 1 | 2 | 0 | 2 |
| | | 14 | 4 | 3 | 17 |
| **FOURTH QUARTER** | | | | | |
| T-BUS | 205—Advanced Typewriting | 2 | 0 | 3 | 3 |
| T-EDP | 104—Introduction to Data Processing Systems | 3 | 2 | 0 | 4 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| T-BUS | 122—Accounting | 5 | 2 | 0 | 6 |
| | | 16 | 4 | 3 | 19 |
| **FIFTH QUARTER** | | | | | |
| T-BUS | 213—Office Procedures | 3 | 2 | 0 | 4 |
| T-BUS | 212—Machine Transcription | 1 | 2 | 0 | 2 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| T-BUS | 209—Advanced Typewriting | 2 | 0 | 3 | 3 |
| T-ENG | 206—Business Communication | 3 | 0 | 0 | 3 |
| | | 12 | 4 | 3 | 15 |
| **SIXTH QUARTER** | | | | | |
| T-BUS | 112-C—Filing | 3 | 2 | 0 | 4 |
| T-BUS | 210—Advanced Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 271-C—Office Management and Supervision | 3 | 2 | 0 | 4 |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| T-BUS | 239—Marketing | 5 | 0 | 0 | 5 |
| | | 16 | 4 | 3 | 19 |

# GENERAL OFFICE TECHNOLOGY

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

T-Eng 101-C—Grammar and Composition: Designed to aid the student in the improvement of self-expression in both writing and speaking. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English, grammar and written composition in their day to day situations.
Prerequisite: None

T-Bus 102—Typewriting: Introduction to the touch typewriting system with emphasis on correct techniques, mastery of the keyboard, simple business correspondence, tabulation, and manuscripts. Minimum speed requirement —15 gross words a minute with 5 errors allowed.
Prerequisite: None

T-Mat 110—Business Mathematics: This course stresses the fundamental operations and their application to business problems. Topics covered include payrolls, price marking, interest and discount, commission, taxes, and pertinent use of mathematics in the field of business.
Prerequisite: None

T-Eco 102—Economics: The fundamental principles of economics including the institutions and practices by which people gain a livelihood. Included is a study of the laws of supply and demand and the principles bearing upon production, exchange, distribution, and consumption both in relation to the individual enterprise and to society at large.
Prerequisite: None

T-Bus 101—Introduction to Business: A survey of the business world with particular attention devoted to the structure of the various types of business organization, methods of financing, internal organization, and management.
Prerequisite: None

### SECOND QUARTER

T-Eng 102-C—Grammar and Composition: In this continuation of T-Eng 101-C, emphasis is placed on advanced grammar and diction and the application of these in compositional work culminating in a term paper.
Prerequisite: T-Eng 101-C

T-Bus 103—Typewriting: Instruction emphasizes the development of speed and accuracy with further mastery of correct typewriting techniques. These skills and techniques are applied in tabulation, manuscript, correspondence, and business forms. Minimum speed requirement—25 gross words a minute with 5 errors allowed.
Prerequisite: T-Bus 102 or equivalent

T-Bus 115-C—Business Law: A general course designed to acquaint the student with certain fundamentals and principles of business law, including contracts, negotiable instruments, and agencies.
Prerequisite: None

T-Bus 120—Accounting: Principles, techniques and tools of accounting, for understanding of the mechanics of accounting. Collecting, summarizing, analyzing and reporting information about service and mercantile enterprises to include practical application of the principles learned.
Prerequisite: T-Mat 110

T-Eco 104—Economics: Greater depth in principles of economics, including a penetration into the composition and pricing of national output, distribution of income, international trade and finance, and current economic problems.
Prerequisite: T-Eco 102

THIRD QUARTER

T-Eng 104—Reading and Composition: Advances the student's compositional skills learned in 102 (Grammar and Composition) by combining them with reading. After an introduction to reading mechanics, the student reacts to ideas encountered in various fiction and non-fiction materials.
Prerequisite: T-Eng 102-C

T-Bus 104—Typewriting: Emphasis on production typing problems and speed building. Attention to the development of the student's ability to function as an expert typist, producing mailable copies. The production units are tabulation, manuscript, correspondence and business forms. Minimum speed requirement —35 gross words a minute with 4 errors allowed.
Prerequisite: T-Bus 103 or equivalent

T-Bus 121—Accounting: Partnership and corporation accounting including a study of payrolls, federal and state taxes. Emphasis is placed on the recording, summarizing, and interpreting data for management control rather than on bookkeeping skills. Accounting services are shown as they contribute to the recognition and solution of management problems.
Prerequisite: T-Bus 120

T-Bus 183—Terminology and Vocabulary (Technical): To develop an understanding of the terminology and vocabulary appropriate to the course of study, as it is used in business, technical, and professional offices.
Prerequisite: None

T-Bus 110-C—Office Machines: A general survey of the business and office machines. Students will receive training in techniques, processes, operation and application of the ten-key adding machine, full keyboard adding machines, and calculator.
Prerequisite: None

FOURTH QUARTER

T-Bus 205—Advanced Typewriting: Emphasis is placed on the development of individual production rates. The student learns the techniques needed in planning and in typing projects that closely approximate the work appropriate to the field of study. These projects include review of letter forms, methods of duplication, statistical tabulation, and the typing of reports, manuscripts and legal documents. Minimum speed requirement—40 gross words a minute with 3 errors allowed.
Prerequisite: T-Bus 104

T-Edp 104—Introduction to Data Processing Systems: Fundamental concepts and operational principles of data processing systems, as an aid in developing a basic knowledge of computers, a prerequisite to the detail study of particular computer problems.
Prerequisite: None

T-Psy 206-C—Applied Psychology: A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given

to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and member of the general community.
Prerequisite: None

T-Eng 204—Oral Communication: A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement in interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

T-Bus 122—Accounting: Advanced practice problems in accounting. Emphasis on detailed and accurate interpretation of data for management.
Prerequisite: T-Bus 121

## FIFTH QUARTER

T-Bus 213—Office Procedures: Designed to acquaint the student with the responsibilities encountered by a general office worker during the work day. These include the following: receptionist duties, handling the mail, telephone techniques, travel information, telegrams, office records, purchasing of supplies, office organization, and insurance claims.
Prerequisite: None

T-Bus 212—Machine Transcription: A study and practice in the use of transcribing machines in business dictation. Proficiency in word usage, correct grammar, and letter styles will be emphasized.
Prerequisite: T-Bus 103

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effect of social life on human personality and behavior.
Prerequisite: None

T-Bus 209—Advanced Typewriting: Emphasis is placed on speed building and on typing projects related to actual office situations. These include additional duplication, tabulation, and the typing of rough-draft and straight-copy documents, reports, and forms used in legal, technical and business offices. Minimum speed requirement—45 gross words a minute with 3 errors allowed.
Prerequisite: T-Bus 205

T-Eng 206—Business Communication: Develops skills in techniques of writing business communications. Emphasis is placed on writing action in such situations as sales applications, orders, letters involving credit, collections, adjustments, and inquiry.
Prerequisite: T-Eng 102-C

## SIXTH QUARTER

T-Bus 112-C—Filing: Fundamentals of indexing and filing, combining theory and practice by the use of miniature letters, filing boxes and guides. Alphabetic, Triple Check, Automatic, Geographic, Subject, Soundex, and Dewey Decimal filing.
Prerequisite: None

**T-Bus 210—Advanced Typewriting:** A course designed to fill the need of the student in his final quarter of typewriting. Additional emphasis placed on accuracy and speed. Minimum speed requirement—50 gross words a minute with 3 errors allowed.
Prerequisite: T-Bus 209

**T-Bus 271-C—Office Management and Supervision:** Presents the fundamentals of office management, including office automation, planning, controlling, and organizing. Emphasis is placed on securing an effective work force and the role of the supervisor.
Prerequisite: None

**T-Soc 206—American Institutions:** A study of the effect of American social, economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.
Prerequisite: None

**T-Bus 239—Marketing:** A study of the marketing structure within the framework of the U. S. economic system. It includes the study of the movement of goods from producer to consumer through various channels of distribution, the functions of marketing, the social and economic implications.
Prerequisite: None

## GENERAL OCCUPATIONAL TECHNOLOGY

This curriculum is designed to provide adults with an opportunity to earn an Associate in Applied Science Degree by taking occupationally oriented courses either from the regular curriculum offerings of the Institute during the daytime, or from single credit earning courses offered at night. The curriculum is of particular value to individuals who are employed and need technical training for upgrading skills needed for their present jobs, or preparation for moving to higher levels of employment.

A total of 112 quarter hours of curriculum credit must be completed to earn the Associate Degree. All students will take a course of general education consisting of 12 quarter hours credit in English, 15 quarter hours in mathematics, 12 quarter hours in physics, and 9 quarter hours in social science. The remaining 64 quarter hours of credit may be selected by the student from technical courses listed in the Institute's catalog and/or from individual credit earning curriculum courses approved by the Institute's curriculum committee. While not required, it is expected that individuals will consult the Student Services Division of the Institute and their employers when selecting the occupationally oriented courses to complete their degree program.

Credit for previous education and experience (through qualifying examinations) will be granted students in this curriculum under the same provisions as for other curricula offered by the Institute. Prerequisites for all courses must be satisfied.

## GENERAL OCCUPATIONAL TECHNOLOGY

| REQUIRED COURSES | | Hours Per Week Class | Lab | Shop | Quarter Hours Credit |
|---|---|---|---|---|---|
| T-ENG | 101—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-ENG | 102—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-ENG | 103—Report Writing | 3 | 0 | 0 | 3 |
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| | | | | | 12 |
| T-MAT | 101-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 102-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 103-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| | | | | | 15 |
| T-PHY | 101—Physics: Properties of Matter | 3 | 2 | 0 | 4 |
| T-PHY | 102—Physics: Work, Energy and Power | 3 | 2 | 0 | 4 |
| T-PHY | 103—Physics: Electricity | 3 | 2 | 0 | 4 |
| or | | | | | |
| T-PHY | 104—Physics: Light and Sound | (3) | (2) | (0) | (4) |
| | | | | | 12 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| | | | | | 9 |
| | TOTAL QUARTER HOURS CREDIT | | | | 48 |

### ELECTIVE COURSES

64 quarter hours credit to be taken from credit earning technical courses carried in the Institute's catalog and/or individual credit earning technical courses approved by the Institute's curriculum committee.

## GENERAL OCCUPATIONAL TECHNOLOGY

| COURSE TITLE | | Hours Per Week Class | Lab | Shop | Quarter Hours Credit |
|---|---|---|---|---|---|
| T-AHR | 101—Fundamentals of Refrigeration I | 4 | 0 | 3 | 5 |
| T-AHR | 102—Fundamentals of Refrigeration II | 3 | 0 | 6 | 5 |
| T-ARC | 101—Architectural Graphics I | 3 | 0 | 6 | 5 |
| T-ARC | 102—Architectural Graphics II | 3 | 0 | 6 | 5 |
| T-ARC | 103—Architectural Graphics III | 3 | 0 | 6 | 5 |
| T-ARC | 121—Architectural Materials and Methods I | 3 | 0 | 3 | 4 |
| T-ARC | 135—Codes, Contract Documents and Specifications | 3 | 0 | 3 | 4 |
| T-ARC | 201—Architectural Graphics IV | 2 | 0 | 9 | 5 |
| T-BIO | 101—Human Anatomy and Physiology | 4 | 2 | 0 | 5 |
| T-BIO | 107—Human Anatomy and Physiology I | 4 | 2 | 0 | 5 |
| T-BIO | 108—Human Anatomy and Physiology II | 4 | 2 | 0 | 5 |
| T-BIO | 115—Medical Terminology and Vocabulary I | 3 | 0 | 0 | 3 |
| T-BIO | 116—Medical Terminology and Vocabulary II | 3 | 0 | 0 | 3 |

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| | | Class | Lab | Shop | Credit |
| T-CIV | 201—Properties of Engineering Materials | 2 | 0 | 3 | 3 |
| T-CIV | 216—Strength of Materials | 3 | 2 | 0 | 4 |
| T-CIV | 217—Construction Planning, Equipment and Methods | 3 | 2 | 0 | 4 |
| T-CIV | 218—Plain Concrete | 3 | 0 | 3 | 4 |
| T-CIV | 223—Codes, Contracts and Specifications | 2 | 0 | 0 | 2 |
| T-DFT | 103—Technical Drafting III | 0 | 0 | 6 | 2 |
| T-DFT | 106—Architectural Drafting | 2 | 0 | 6 | 4 |
| T-DFT | 107—Architectural Drafting | 2 | 0 | 6 | 4 |
| T-DFT | 108—Architectural Drafting | 0 | 0 | 9 | 3 |
| T-DFT | 110—Technical Sketching | 1 | 0 | 3 | 2 |
| T-DFT | 112—Electronic Drafting | 2 | 0 | 3 | 3 |
| T-DFT | 118—Drafting and Blueprint Interpretation | 0 | 0 | 6 | 2 |
| T-DFT | 220—Architectural Drafting | 2 | 0 | 6 | 4 |
| T-DFT | 221—Architectural Drafting | 2 | 0 | 9 | 5 |
| T-DFT | 222—Architectural Drafting | 2 | 0 | 9 | 5 |
| T-DFT | 230—Structural Drafting | 2 | 0 | 6 | 4 |
| T-DFT | 231—Architectural Mechanical Equipment Drafting | 2 | 0 | 6 | 4 |
| T-DFT | 233—Architectural Office Practice Seminar | 2 | 0 | 0 | 2 |
| T-DFT | 235—Codes, Specifications and Contract Documents | 3 | 0 | 3 | 4 |
| T-DFT | 236—Construction Estimating and Field Inspection | 3 | 0 | 3 | 4 |
| T-EGR | 101—Introduction to Engineering Technology | 0 | 0 | 3 | 1 |
| T-EGR | 104—Basic Design Principles | 2 | 2 | 0 | 3 |
| T-EGR | 111—Slide Rule (Same at MAT 1111) | 0 | 2 | 0 | 1 |
| T-ISC | 120—Principles of Industrial Management | 5 | 0 | 0 | 5 |
| T-ISC | 210—Job Analysis and Evaluation | 3 | 2 | 0 | 4 |
| T-ISC | 211—Work Measurement | 3 | 2 | 0 | 4 |

## GENERAL OCCUPATIONAL TECHNOLOGY

### COURSE DESCRIPTIONS

**T-Ahr 101—Fundamentals of Refrigeration I:** Terminology, laws of refrigeration, absolute pressure and absolute temperature, energy conversion units; specific heat, latent heat, and sensible heat; measurement of heat in quantity and intensity; tone of refrigeration, pressure temperature relationships; transfer of heat by conduction, convection and radiation; elementary refrigeration, refrigeration cycle and refrigerant controls. Tools, materials and methods applicable to air conditioning and refrigeration.

Prerequisite: None

**T-Ahr 102—Fundamentals of Refrigeration II:** Refrigerants and their application in commercial refrigeration; system components accessories, installation procedures and techniques; diagnosing service problems of mechanical difficulties; methods of defrosting; and making sketches of designs for high, medium and low temperature installations. Symbols for refrigeration and piping equipment will be used in making sketches.

Prerequisite: T-Ahr 101, T-Phy 101

**T-Arc 101—Architectural Graphics I:** This course is designed to provide fundamental knowledge of the principles of graphics as they apply to architecture. The basic skills and techniques of architectural expression, sketching and architectural lettering are stressed. Geometrical construction, orthographic

drawing, paraline drawing, and projection problems dealing with descriptive geometry in architecture are studied. A basic study of contemporary architects and their work is also presented to acquaint the student with present day architecture.
Prerequisite: None

T-Arc 102—Architectural Graphics II: A continuation of the fundamental knowledge of the principles of architectural graphics. Drafting expression in architectural drawing is studied with the basic control of line quality and drafting technique stressed. The introduction to basic architectural drafting and working drawing, which will lead to the student's ability to express entailing ideas and skillful graphic communication on a professional level, is initiated. The study of contemporary architects, sketching and architectural lettering is continued.
Prerequiiste: T-Arc 101

T-Arc 103—Architectural Graphics III: The study of architectural drafting expression, techniques and descriptive geometry applications are continued in depth. The student studies typical architectural details and techniques relative to the preparation of detailed working drawings. Using preliminary sketches, the student will proceed and complete a full set of working drawings, on a professional level, of a small light framed building. Good use of appropriate drafting expression and techniques will be stressed. Continued study and practice of architectural lettering and sketching will be stressed.
Prerequisite: T-Arc 101, T-Arc 102

T-Arc 121—Architectural Materials and Methods I: General broad base study of basic materials and methods used in the construction of architectural structures will be studied. Field trips to manfacturing sites and study of light construction techniques are included.
Prerequisite: T-Arc 101

T-Arc 135—Codes, Contract Documents, and Specifications: A study of building codes and their effect in relation to specifications and drawings. The purpose and writing of specifications will be studied along with their legal and practical application to working drawings. Contract documents will be analyzed and studied for the purpose of client-architecture-contractor responsibilities, duties and mutual responsibilities.
Prerequisite: T-Arc 101

T-Arc 201—Architectural Graphics IV: The integration of structural components in architectural working drawings relative to steel, concrete and timber structural elements will be stressed. Working drawings will be prepared to indicate appropriate details necessary for fabrication and erection of structural members and connections. The correlation of shop drawings with working drawings will be studied. Reference material will be introduced to provide the necessary information to prepare structural drawings and to provide the student with skills and knowledge in locating data and in using handbooks.
Prerequisites: T-Arc 101, T-Arc 102, T-Arc 103

T-Bio 101—Human Anatomy and Physiology: A study of the organizational plan of the human body and of the body systems concerned with motor activities, control and integration of functions, and reproduction. Laboratory experiences provide opportunities to see animal specimens illustrative of systems being studied.
Prerequisite: None

T-Bio 107—Human Anatomy and Physiology I: A study of the structure and normal function of the human body with man identified as a living organism composed of living cells, tissues, organs, and systems. Included are the basic physiologic aspects of skin; the skeletal, articular, muscular, and nervous systems; and the special senses. A laboratory portion should include relevant experiments to augment the student's learning of body structure and function.
Prerequisite: None

T-Bio 108—Human Anatomy and Physiology II: A continuation of the study of the structure and normal function of man as a living organism. Special emphasis is on the circulatory, lymphatic, respiratory, digestive, urinary, endocrine, and reproductive systems and fluid and electrolyte balance. Laboratory experiences includes study of models and small animal dissection for insight into comparative structure and function of man.
Prerequisite: T-Bio 107

T-Bio 115—Medical Terminology and Vocabulary I: An introductory course for paramedical personnel, which deals with basic tools for building a medical vocabulary and mastering the identification of anatomical roots, prefixes and suffixes of words, as well as Greek and Latin verbs and adjectives. Anatomical body parts, diseases, operations, tumors, drugs, and descriptive terms are emphasized by analysis of the terms and structure of the words.
Prerequisite: None

T-Bio 116—Medical Terminology and Vocabulary II: Continuation of the study of medical terminology in building a medical vocabulary which deals with the mastery of the identification of anatomical roots, prefixes, and suffixes, of words, as well as Greek and Latin verbs and adjectives. Antomical body parts, diseases, operations, tumors, drugs, and descriptive terms are emphasized by analysis of the terms and structure of the words. Additional emphasis will be in the area of mental health and illness as well as anesthesia and laboratory terminology.
Prerequisite: T-Bio 115

T-Civ 201—Properties of Engineering Materials: Study and testing of the properties of ferrous and non-ferrous metals, timber, stone, clay products, bituminous cementing materials and plastics; load and strain measurements; behavior of materials under load; qualities other than strength; control of the properties of the materials; nondestructive test.
Prerequisite: None

T-Civ 216—Strength of Materials: Study of principles and analysis of stresses which occur within machine and structure elements subjected to various types of loads such as static, impact, varying and dynamic. Analyses of these stresses are made as applied to riveted and welded joints, beams, shafts, keys and couplings and other machine components.
Prerequisite: None

T-Civ 217—Construction Planning, Equipment and Methods: Excavating methods and equipment used in building and highway construction; pile driving; construction techniques and equipment used in reinforced concrete buildings, bridges, lift-slabs, thin-shells and folded plates, erection methods and equipment for structural steel buildings and bridges, carpentry in house and heavy timber construction; construction safety. Field inspection trips.
Prerequisite: None

T-Civ 218—Plain Concrete: Study and testing of the composition and properties of concrete including cementing agents, aggregates, admixtures, and air entrainment; design and proportioning of concrete mixes to obtain predetermined strengths and properties; methods of placing and curing concrete; standard control tests of concrete.
Prerequisite: None

T-Civ 223—Codes, Contracts, and Specifications: Basic principles and methods most significant in contract relationships; appreciaton of the legal considerations in construction work; study of the National Building Code and local building codes; interpreting and outlining specifications.
Prerequisite: T-Civ 201

T-Dft 103—Technical Drafting III: Intersection and developments and their practical solutions. Where applicable, model solutions accompany the problems.

The various techniques employed to produce and render isometric and oblige drawings, isometric, dimetric and trimetric projections, will be included.
Prerequisites: T-Dft 101, T-Dft 102

**T-Dft 106—Architectural Drafting:** Basic technique and skills of drafting are developed in conjunction with a study of the graphical analysis of space problems. Problems deal with points, lines, and planes in space studied by freehand and mechanical drawing methods. Proficiency in two dimensional—three dimensional relationships is developed through use of orthographic and isometric sketching and drafting. Lettering is emphasized and developed through concentrated lettering practice and through labeling of all drawings and exercises.
Prerequisite: T-Dft 101

**T-Dft 107—Architectural Drafting:** Development of techniques in architectural lettering, symbols, and their interpretation. Freehand and instrument drafting. Drawing of construction details, using appropriate material symbols and connections. Sections and scale details will be prepared from preliminary sketches. Applications of descriptive geometry are used in visualization and analytical solutions of the drafting problems involving auxiliary views, intersections and developments.
Prerequisite: T-Dft 101

**T-Dft 108—Architectural Drafting:** An approach, in depth, to the study of architectural drafting. Development of techniques in lettering, dimensioning, freehand sketching and instrument drawing. Drawing of construction details using appropriate symbols and conventions are developed from sketched details and characteristics of the construction details to be drawn are studied and reported on through supplementary research.
Prerequisite: T-Dft 107

**T-Dft 110—Technical Sketching:** A course in the development of skill in sketching as a means of communication through the drawing medium, extension of verbal and written communication and thought extension and problem analysis.
Prerequisite: None

**T-Dft 112—Electronic Drafting:** This course will provide experience in the various types of drawings used by the electronics industry. Chassis layouts, block diagrams, circuit diagrams, and related mechanical drawings will be included.
Prerequisite: None

**T-Dft 118—Drafting and Blueprint Interpretation:** Basic drafting techniques are covered to provide a working knowledge of drafting as a tool for communicating ideas. Reading and interpreting of blueprints is emphasized.
Prerequisite: None

**T-Dft 220—Architectural Drafting:** Drawing of structural plans and details as prepared for building construction including steel, concrete and timber structural components. Appropriate details and drawings necessary for construction and fabrication of structural members. Reference materials will be used to provide the draftsman with skills and knowledge in locating data and in using handbooks.
Prerequisite: T-Dft 108

**T-Dft 221—Architectural Drafting:** An approach in depth to the study of architectural drafting continuing the study of details of construction and introducing the elements of mechanical and electrical equipment systems and their relationship to a finished building.
Prerequisites: T-Dft 108, T-Dft 220

**T-Dft 222—Architectural Drafting:** An approach in depth to the study of architectural drafting in which the final group of detailing types is added and

in which the various parts of construction covered in previous courses is assembled to produce a generally complete set of drawings for a simple building.

Prerequisites: T-Dft 108, T-Dft 220, T-Dft 221

**T-Dft 230—Structural Drafting:** A concentrated study and drawing of structural plans, details and shop drawings of the structural components of buildings to include steel, reinforced concrete, and timber structures. Appropriate symbols, conventions, dimensioning practices, and notes as used by the draftsman will be included. Emphasis will be placed on drafting of appropriate drawings for fabrication and erection of the structural components.

Prerequisite: T-Dft 220

**T-Dft 231—Architectural Mechanical Equipment Drafting:** A detailed study of mechanical and electrical equipment and the reading and interpretation of detailed mechanical and electrical systems drawings prepared by the respective engineering consultants. Heating, air conditioning, lighting, electrical service, water, waste and other architectural structural service systems will be studied. Emphasis will be placed on symbols, graphic representation techniques and the actual preparation of mechanical and electrical systems drawings.

Prerequisite: None

**T-Dft 233—Architectural Office Practice Seminar:** A study of the professional relationship of the architectural firm in relation to clients, contractors, suppliers, consultants and other architects. Ethics of the profession as applicable to the draftsman's role in the architectural firm will be stressed.

Prerequisite: None

**T-Dft 235—Codes, Specifications and Contract Documents:** A study of building codes and their effect in relation to specifications and drawings. The purpose and writing of specifications will be studied along with their legal and practical application to working drawings. Contract documents will be analyzed and studied for the purpose of client-architect-contractor responsibilities, duties and mutual responsibilities.

Prerequisite: T-Dft 231

**T-Dft 236—Construction Estimating and Field Inspection:** Interpretation of working drawings for a project; preparation of material and labor quantity surveys from plans and specifications; approximate and detailed estimates of cost. The student will study materials take-off, labor take-off, sub-contractors' estimates, overhead costs, and bid and contract procedures. Detailed inspection of the construction by comparing the finished work to the specifications.

Prerequisites: T-Dft 231, T-Dft 235

**T-Egr 101—Introduction to Engineering Technology:** An overview of the field of engineering technology, with a discussion of the work of the technician, and his role in the engineering and industrial organizations. The "Conceptual Approach" will give the student an idea of the whole engineering technology. Practice in engineering methodology will be stressed, including development of carefulness and orderliness, use of curves and tables, calculations, experimental laboratory procedures, etc. Field trips give the student an opportunity to see the engineering technician in action. Permanent placement and summer work opportunities will be discussed.

Prerequisite: None

**T-Egr 104—Basic Design Principles:** A study of the Fundamentals of Engineering Design which relates to the philosophy and discipline of design. Topics covered include Brainstorming, Creativity, Models, Optimization Prototypes, Synetics, Testing and the phases of Design: Feasibility Study, Preliminary Design and Detail Design.

Prerequisite: None

T-Egr 111—Slide Rule: This course is designed to provide the student with a good working knowledge of the slide rule and its twenty-odd scales. To cover a basic study of the laws of trigonometry, the laws of exponents and logarithms upon which the slide rule is based. To expose the student to the full operation of the slide rule through a wide variety of problems and their solutions using the slide rule. To develop a confidence in locating decimal point location.

Prerequisite: None

T-Isc 120—Principles of Industrial Management: A study in depth of the organizational and functional aspects of line and linestaff organizations with emphasis on relationships, delegation of authority and assigned responsibilities. Specific emphasis is placed on line staff relationships, functional authority, methods of control, problem solving, and the establishment of management goals and controls. Each student will be required to develop an organizational structure (under a single manager concept) for a hypothetical business of their choosing.

Prerequisite: None

T-Isc 210—Job Analysis and Evaluation: This study is based on product studies as well as personnel and wage program. The course utilizes the study of product design, value analysis, materials and processes as an intricate part of productive procedures.

Prerequisite: None

T-Isc 211—Work Measurement: This course is designed to give the student a broad concept of Work Measurement as a management tool. It includes a study of the development of standard data from the use of stop watch standards, machine data, and the use of elemental time date. (MTM will be used as a demonstration of this type of data). Methods and techniques requiring the use of flow and process charts, work sampling, flow diagrams, and operation charts will be afforded the student under work conditions.

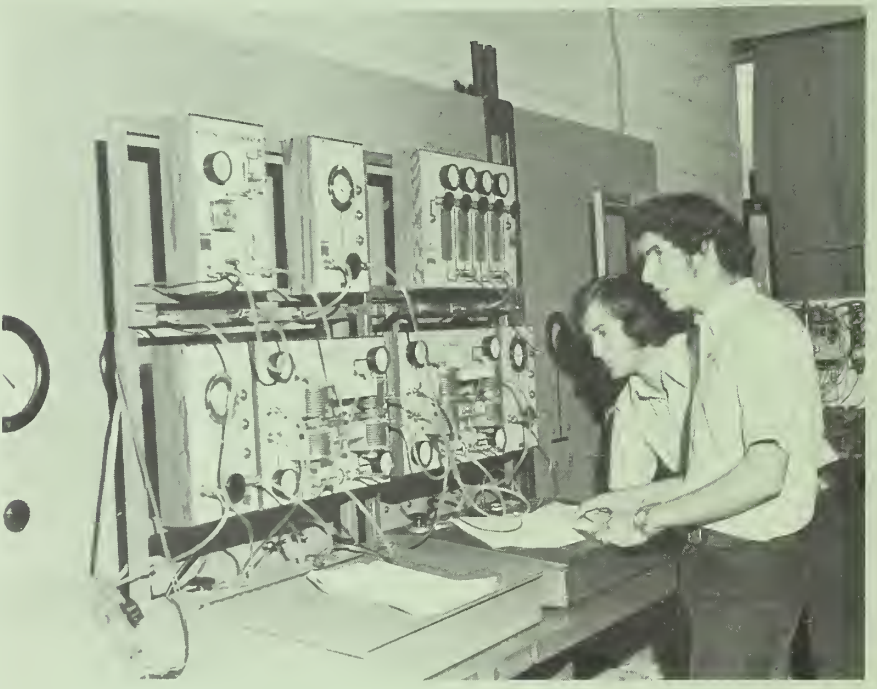
Prerequisite: None

## INSTRUMENTATION TECHNOLOGY

Measuring and controlling instruments are now in such widespread use in our modern world that we take them for granted.

The progress of industry depends on precise, effective, and diversified instruments. The Instrumentation Technician has a tremendous responsibility to both production and production control in all industries.

Instruments are used for measurement and control of industrial manufacturing, conversion, or treating processes. An Instrumentation Technician must deal with variables that affect properties such as temperature, pressure, flow, level, humidity, density, viscosity, etc. In short, instrumentation men are key personnel to keeping a manufacturing firm running. Should any major piece of equipment break down usually it remains out of operation until such time the instrumentation man can make necessary repairs or adjustments. The Instrumentation Technician in most manufacturing plants works with or assists engineers in their work, and therefore training is similar to that of the engineer.



# INSTRUMENTATION TECHNOLOGY

| | | Hours Per Week | | | Quarter Hours Credit |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | |
| T-ENG | 101—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MAT | 101-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 111—Applied Mathematics for Electronics | 5 | 0 | 0 | 5 |
| T-ELC | 107—Electricity I | 4 | 0 | 3 | 5 |
| T-ELN | 106—Electronics I (Instrument Familiarization) | 2 | 0 | 6 | 4 |
| | | 19 | 0 | 9 | 22 |
| **SECOND QUARTER** | | | | | |
| T-ENG | 102—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MAT | 102-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 112—Applied Mathematics for Electronics | 3 | 0 | 0 | 3 |
| T-ELC | 108—Electricity II | 4 | 0 | 3 | 5 |
| T-ELN | 107—Electronics II (Semiconductor Diodes & Vacuum Tubes) | 5 | 0 | 6 | 7 |
| | | 20 | 0 | 9 | 23 |
| **THIRD QUARTER** | | | | | |
| T-ENG | 103—Report Writing | 3 | 0 | 0 | 3 |
| T-MAT | 103-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MAT | 113—Applied Mathematics for Electronics | 3 | 0 | 0 | 3 |
| T-ELC | 109—Electricity III | 4 | 0 | 3 | 5 |
| T-ELN | 108—Electronics III (Transistors) | 5 | 0 | 3 | 6 |
| T-DFT | 101—Technical Drafting | 1 | 0 | 3 | 2 |
| | | 21 | 0 | 9 | 24 |
| **FOURTH QUARTER** | | | | | |
| T-ELN | 241-C—Digital Principles and Applications | 2 | 0 | 3 | 3 |
| T-ELN | 224—Measurement and Control I | 2 | 0 | 9 | 5 |
| T-PHY | 100—Basic Physics | 5 | 2 | 0 | 6 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| | | 12 | 2 | 12 | 17 |
| **FIFTH QUARTER** | | | | | |
| T-ELN | 225—Measurement and Control II | 2 | 0 | 9 | 5 |
| T-CHM | 115-C—Instrumentation Chemistry | 5 | 0 | 3 | 6 |
| T-PHY | 104—Physics: Light and Sound | 3 | 2 | 0 | 4 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| | | 13 | 2 | 12 | 18 |
| **SIXTH QUARTER** | | | | | |
| T-ELN | 226-C—Measurement and Control III | 4 | 0 | 12 | 8 |
| T-ELN | 236—Instrumentation Field Trips | 0 | 0 | 3 | 1 |
| T-BUS | 272—Principles of Supervision | 3 | 0 | 0 | 3 |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| | | 10 | 0 | 15 | 15 |

# INSTRUMENTATION TECHNOLOGY

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

T-Eng 101—Grammar and Composition: This course is designed as a review of the elements of grammar. Exercises involve parts of speech, sentences, punctuation and mechanics, usage and style, spelling, and composition.
Prerequisite: None

T-Mat 101-C—Technical Mathematics: The general area of basic mathematical concepts is presented, including common and decimal fractions, squares and square roots. The essential elements of algebra are also presented, including: positive and negative numbers, algebraic terminology, polynomials, exponents, scientific notation and powers of 10, grouping symbols, first degree and literal equations. Use of the slide rule is introduced at the beginning of this course. The application of principles learned is stressed in practical problems.
Prerequisite: None

T-Mat 111—Applied Mathematics for Electronics: Designed to aid the student by mathematical applications of the basic theories and principles of electricity. Scientific notation, units and dimensions, and Ohm's Law regarding series and parallel DC circuits are studied.
Prerequisite: None

T-Elc 107—Electricity I: Introduction to basic theories and principles of electricity. Electrostatics, basic units, symbols, Ohm's Law, basic DC circuits, power, DC sources, and complex circuits are major parts of the course. Practical applications are stressed.
Prerequisite: None

T-Eln 106—Electronics I: Instrument familiarization. Functional use of the various test instruments used in the Electronics and Instrumentation fields.
Prerequisite: None

### SECOND QUARTER

T-Eng 102—Grammar and Composition: This course is designed to orient students in using a library, learning to use the dictionary, and preparing the term paper. Attention is given to acquaintanceship with magazines and other publications. Writing assignments are frequent.
Prerequisite: T-Eng 101

T-Mat 102-C—Technical Mathematics: This is a continuation of T-Mat 101-C. Numerical trigonometry is introduced in this course and includes right triangles and radian measure of angles. A working knowledge of numerical computations is acquired, utilizing logarithms in conjunction with the slide rule. Linear graphs, simultaneous equations and determinants are also introduced.
Prerequisite: T-Mat 101-C

T-Mat 112—Applied Mathematics for Electronics: This is a continuation of T-Mat 111. Mathematical applications are made to the study of resistivity, multipliers, alternating currents, induction, reactance, impedance, phase relations, and transformers.
Prerequisite: T-Mat 111 or Equivalent

T-Elc 108—Electricity II: A continuation of T-Elc 107. Introduction to meters, magnetism, alternating current theory covering simple generators, sine wave analysis, induction, reactance, impedance, phase relations, and transformers. Practical applications are stressed.
Prerequisite: T-Elc 107 or Equivalent

T-Eln 107—Electronics II (Semiconductor Diodes and Vacuum Tubes): A study of semiconductor diodes, including tunnel diodes, zener diodes, and light emitting diodes, also vacuum tube characteristics, circuit parameters of basic amplifiers. Filter circuits, RL, RC and RLC.
Prerequisite: T-Elc 107 and T-Eln 106

## THIRD QUARTER

T-Eng 103—Report Writing: The fundamentals of English are utilized as a back ground for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.
Prerequisite: None

T-Mat 103-C—Technical Mathematics: This is a continuation of T-Mat 102-C. More advanced algebraic subjects are presented, including: Special products, factoring, algebraic fractions, exponents and radicals, vector and phasor algebra, quadratic equations, graphs of quadratics, maximum and minimum, and imaginary numbers. Measurements and computations involving areas and volumes of regular figures and solids are introduced as well as trigononometric functions of oblique triangles.
Prerequisite: T-Mat 102-C

T-Mat 113—Applied Mathematics for Electronics: This is a continuation of T-Mat 112. Mathematical applications are made to the study of capacitance, complex RCL circuits, resonance, filters and multiphase power.
Prerequisite: T-Mat 112 or Equivalent

T-Elc 109—Electricity III: A continuation of T-Elc 108. Introduction to capacitance, complex RCL circuits, resonance, filters and multiphase power. Practical applications are stressed.
Prerequisite: T-Elc 108 or Equivalent

T-Eln 108—Electronics III (Transistors): Theory & Applications of Transistor Circuits, Biasing, class of amplifiers, oscillators, multi-vibrators, coupling, push-pull and push-push amplifiers, and miscellaneous applications will be studied. Continued study of transducer theory and application.
Prerequisite: T-Elc 107

T-Dft 101—Technical Drafting: The field of drafting is introduced as the student begins study of drawing principles and practices for print reading and describing objects in the graphic language. Basic skills and techniques of drafting included are: use of drafting equipment, lettering, freehand orthographic and pictorial sketching, geometric construction, orthographic instrument drawing of principal views, and standards and practices of dimensioning.
Prerequisite: None

## FOURTH QUARTER

T-Eln 241-C—Digital Principles and Applications: Basic computer concepts including: Binary and Octal numbers, binary codes, boolean algebra, arithmetic circuits, logic gates, flip-flops, input-out devices, memory devices, D/A and A/D converters.
Prerequisite: None

T-Eln 224—Measurement and Control I: Theory and calibration of pressure gauges, vacuum gauges, and pressure switches, using laboratory standards: Dead weight tester, manometer and precision test gauges and associated hardware. Covers the philosophy of measurement and control, levels of accuracy and traceability. General shop practices are included.
Prerequisite: T-Mat 111

T-Phy 100—Basic Physics: A basic course in Introductory Physics. Designed to acquaint the student with common conversion factors and how to use them. The principles of simple machines and mechanics are presented. Measurement and the use of various measuring instruments are investigated.
Prerequisite: None

T-Psy 206-C—Applied Psychology: A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None

FIFTH QUARTER

T-Eln 225—Measurement and Control II: A study of control theory and applications with emphasis on electronic and electric controls and mechanisms. Control loops and configurations of electronic and pneumatics constructed and placed in operation. Applications of interfacing covered. Calibration and alignment of constructed systems.
Prerequisite: T-Eln 224

T-Chm 115-C—Instrumentation Chemistry: This chemistry course has been designed to acquaint the Instrumentation student with some of the basic chemical concepts. In the laboratory, these concepts will be put into practice using industrial type equipment to gather the necessary data.
Prerequisite: None

T-Phy 104—Physics: Light and Sound—A study of sound and wave motion and its technical applications to industry and related fields. Light and illumination. Principles of optical instruments. Practical aspects are emphasized.
Prerequisites: T-Mat 103-C, T-Phy 100 or T-Phy 101

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effects of social life on human personality and behavior.
Prerequisite: None

SIXTH QUARTER

T-Eln 226-C—Measurement and Control III: Troubleshooting techniques studied and practiced using standard instrument maintenance test equipment. Includes setting up actual loops and control systems, tubing and piping layouts studied. Instruments dismantled and reassembled, calibrated and placed in service.
Prerequisites: T-Eln 225 and T-Chm 115-C

T-Eln 236—Instrumentation Field Trips: Field trips to local industries. Lectures by instrument technicians and engineers.
Prerequisite: None

T-Bus 272—Principles of Supervision: Introduces the basic responsibilities and duties of the supervisor and his relationship to superiors, subordinates, and associates. Emphasis on securing an effective work force and the role of the supervisor. Methods of supervision are stressed.
Prerequisite: None

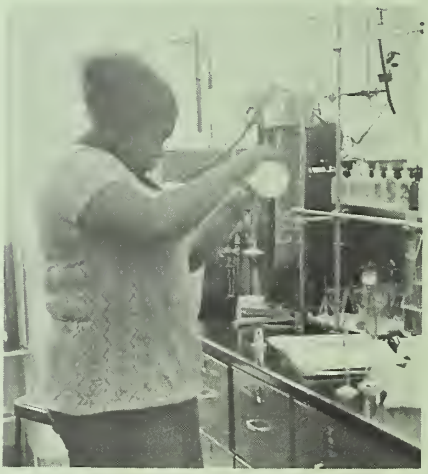
T-Soc 206—American Institutions: A study of the effect of American social, economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.
Prerequisite: None

## MANUFACTURING PROCESSES CONTROL TECHNOLOGY

### (Chemical Technology)

This curriculum has been designed to train the student to have sufficient proficiency in understanding basic chemical manufacturing processes and industrial laboratory techniques to find employment in the chemical field as a technician working under the direction of a Chemist or a Chemical Engineer.

Special emphasis is placed on sources of pollution and the chemical and mechanical methods that are used to clean up air and water pollution from manufacturing operations.



# MANUFACTURING PROCESSES CONTROL TECHNOLOGY

## (Chemical Technology)

| | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|
| **FIRST QUARTER** | Class | Lab | Shop | Credit |
| T-CHM 114—Basic Chemical Concepts | 5 | 0 | 6 | 7 |
| T-PHY 100—Basic Physics | 5 | 2 | 0 | 6 |
| T-MAT 104—Basic Mathematics | 5 | 0 | 0 | 5 |
| T-ENG 101—Grammar and Composition | 3 | 0 | 0 | 3 |
| | 18 | 2 | 6 | 21 |
| **SECOND QUARTER** | | | | |
| T-CHM 115—Industrial Chemistry | 5 | 0 | 6 | 7 |
| T-PHY 105—Physics: Heat and Fluids | 3 | 2 | 0 | 4 |
| T-MAT 105—Basic Mathematics (Simple Algebra) | 5 | 0 | 0 | 5 |
| T-ENG 102—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-PSY 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| | 19 | 2 | 6 | 22 |
| **THIRD QUARTER** | | | | |
| T-CHM 116—Industrial Chemistry | 5 | 0 | 6 | 7 |
| T-CHM 150—Industrial Operations | 3 | 0 | 0 | 3 |
| T-MAT 107—Industrial Calculations | 3 | 0 | 0 | 3 |
| T-ENG 103—Report Writing | 3 | 0 | 0 | 3 |
| T-PHY 103—Physics, Electricity | 3 | 2 | 0 | 4 |
| | 17 | 2 | 6 | 20 |
| **FOURTH QUARTER** | | | | |
| T-CHM 117-C—Unit Processes | 0 | 2 | 18 | 7 |
| T-CHM 151—Industrial Operations | 3 | 0 | 0 | 3 |
| T-ENG 204—Oral Communications | 3 | 0 | 0 | 3 |
| T-CHM 180—Water Technology | 3 | 0 | 0 | 3 |
| | 9 | 2 | 18 | 16 |
| **FIFTH QUARTER** | | | | |
| T-MEC 107—Process Instrumentation | 3 | 0 | 0 | 3 |
| T-CHM 243—Industrial Analysis | 2 | 0 | 9 | 5 |
| T-CHM 230—Organic Chemistry | 3 | 0 | 6 | 5 |
| T-SOC 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| | 11 | 0 | 15 | 16 |
| **SIXTH QUARTER** | | | | |
| T-CHM 244—Industrial Analysis | 2 | 0 | 9 | 5 |
| T-CHM 231-C—Organic Chemistry | 3 | 0 | 6 | 5 |
| T-MEC 215—Metallurgy | 3 | 0 | 0 | 3 |
| T-MEC 108—Process Instrumentation | 3 | 0 | 0 | 3 |
| | 11 | 0 | 15 | 16 |
| **SEVENTH QUARTER** | | | | |
| T-CHM 245—Industrial Analysis | 2 | 0 | 9 | 5 |
| T-CHM 232-C—Organic Chemistry | 3 | 0 | 6 | 5 |
| T-MEC 235-C—Hydraulics and Pneumatics | 3 | 0 | 3 | 4 |
| T-SOC 206—American Institutions | 3 | 0 | 0 | 3 |
| | 11 | 0 | 18 | 17 |

# MANUFACTURING PROCESSES CONTROL TECHNOLOGY
## (Chemical Technology)

### COURSE DESCRIPTIONS BY QUARTERS

#### FIRST QUARTER

**T-Chm 114—Basic Chemical Concepts:** The student is introduced to some of the basic concepts of chemistry; to the elements in general; to physical properties of elements and compounds; to generalized chemical reactions; the major differences between organic and inorganic chemicals with respect to bonding are discussed.
Prerequisite: None

**T-Phy 100—Basic Physics:** The student learns some of the more common conversion factors for changing the English system to the metric system. The principles of simple machines and mechanics are presented. Measurement and the instruments used are discussed.
Prerequisite: None

**T-Mat 104—Basic Mathematics:** A general review of arithmetic with emphasis on decimals, fractions and percent. A thorough coverage of ratio and proportion.
Prerequisite: None

**T-Eng 101—Grammar and Composition:** This course is designed as a review of the elements of grammar. Exercises involve parts of speech, sentences, punctuation and mechanics, usage and style, spelling, and composition.
Prerequisite: None

#### SECOND QUARTER

**T-Chm 115—Industrial Chemistry:** Several well known processes for the production of chemical products will be studied in detail. The student will learn why chemicals are used to produce specific results; how they are handled; and some of the ways reactions may be controlled.
Prerequisite: T-Chm 114

**T-Phy 105—Physics: Heat and Fluids:** The importance of heat will be stressed. The various temperature scales will be covered and various instruments used for the determination of temperature will be operated in the laboratory. The general principles of heat transfer will be discussed. The effects of heat on density, boiling point, vapor pressure, viscosity and surface tension of fluids will be investigated.
Prerequisite: T-Phy 100

**T-Mat 105—Basic Mathematics:** The application of simple algebra to the solving of practical problems is the main objective of this course. The student will learn to use mathematical tables and how to construct and read graphs. Use of conversion factors and scientific notation will be used throughout the course.
Prerequisite: T-Mat 104

**T-Psy 206-C—Applied Psychology:** A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to person and group dynamics so that the student may learn to apply the principle of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None

T-Eng 102—Grammar and Composition: This course is designed to orient students in using a library, learning to use the dictionary, and preparing the term paper. Attention is given to acquaintanceship with magazines and other publications. Writing assignments are frequent.
Prerequisite: T-Eng 101

THIRD QUARTER

T-Chm 116—Industrial Chemistry: The course covers a more detailed coverage of industrial chemical processes and includes a thorough discussion of the more important metals and non-metals.
Prerequisite: T-Chm 115

T-Chm 150—Industrial Operations: The student learns about the designs and operation of various standard pieces of equipment used in the chemical industry. The use of various materials of construction will be discussed in each case.
Prerequisite: None

T-Mat 107—Industrial Calculations: This course is designed to provide review, practice and applications of the mathematical techniques required to solve chemical problems effectively. The entire emphasis of the course will be on solving problems involving applications of specific formulas and methods encountered in the field of chemistry.
Prerequisites: T-Mat 104 and 105

T-Eng 103—Report Writing: The fundamentals of English are utilized as a background for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.
Prerequisite: None

T-Phy 103—Physics: Electricity: Basic theories of electricity, methods of production, and transmission and transforming of electricity. Electron theory, electricity by chemical action, electricity by friction, electricity by magnetism, induction voltage, amperage, resistance, horsepower, wattage, and transformers are major parts of the course.
Prerequsites: T-Mat 104-105; T-Phy 100

FOURTH QUARTER

T-Chm 117-C—Unit Processes: The student will operate industrial type equipment, take samples, record data and perform any other duties normally connected with a unit operation. He will be given detailed instructions that must be read, understood and followed. He will assist in the assembly of equipment and any repair work that needs to be done "on the job."
Prerequisites: All previous Chemistry, Physics and Mathematics courses

T-Chm 151—Industrial Operations: This is a continuation of the course started in the third quarter.
Prerequisite: T-Chm 150

T-Eng 204—Oral Communication: A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement in interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

T-Chm 180—Water Technology: This course covers the many forms of pollution of water and how this pollution would limit the use of water in specific

applications. Also the various methods of purifying water on an industrial scale will be discussed.

Prerequisite: All previous chemistry courses and industrial operations courses

FIFTH QUARTER

T-Chm 243—Industrial Analysis: The student will learn to follow analytical procedures involving acid-base reactions, oxidation reduction reactions utilizing volumetric and gravimetric methods. Industrial type instruments will be used where applicable. The principles of qualitative and quantitative analysis will be combined for the isolation, identification and percentage determination of various mixtures. The determination of physical constants will be thoroughly used.

Prerequisites: T-Chm 114; T-Mat 104-105

T-Chm 230—Organic Chemistry: The student will study the various families of carbon chemistry from the simplest alkane to rather complex polymerization products. He will learn how organic compounds are prepared and some of the specialized reactions that the various groups undergo. Laboratory work will acquaint the student with a number of naturally occurring chemicals. Preparation of derivatives and specialized tests will be used for identification purposes.

Prerequisite: T-Chm 114

T-Mec 107—Process Instrumentation: This is a lecture course to introduce the student to the theory and operational principles of industrial process instruments.

Prerequisite: None

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affectng the organization of such relationships and the effects of social life on human personality and behavior.

Prerequisite: None

SIXTH QUARTER

T-Chm 244—Industrial Analysis: This is a continuation of the course started in the fifth quarter.

Prerequisite: T-Chm 243

T-Chm 231-C—Organic Chemistry: This is a continuation of the course started in the fifth quarter.

Prerequisite: T-Chm 230

T-Mec 215—Metallurgy: This course introduces the student to the physical properties of various industrially important alloys. The student will use manufacturers' catalogs, brochures, and physical properties tables to determine the types of metals to be used in equipment design.

Prerequisite: None

T-Mec 108—Process Instrumentation: This is a continuation of the course T-Mec 107 with the addition of laboratory experience in the calibration and operation of various industrial instruments.

Prerequisite: T-Mec 107

SEVENTH QUARTER

T-Chm 245—Industrial Analysis: This is a continuation of the course started in the sixth quarter.

Prerequisite: T-Chm 244

**T-Chm 232-C—Organic Chemistry:** This is a continuation of T-Chm 230, the course started in the fifth quarter.

Prerequisite: T-Chm 231-C

**T-Mec 235-C—Hydraulics and Pneumatics:** In this course the student will learn the basic ideas of hydraulic and pneumatic systems. In so doing the student will develop an understanding of various hydraulic and pneumatic controls and their relationships and function in circuits. Symbols and conventional practices will be stressed.

Prerequisite: T-Phy 105

**T-Soc 206—American Institutions:** A study of the effect of American social, economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.

Prerequisite: None

## MARINE CONSTRUCTION ENGINEERING TECHNOLOGY

The Marine Construction Engineering Technology program is one of two years duration (7 quarters) with summer employment in marine related fields a requirement. Emphasis is on a comprehensible and practical application of the skills necessary for a marine construction technician.

Marine construction technicians help plan and supervise various projects on our rivers, sounds, coast, and oceans. Some of these projects are power plants, bridges, sea walls, jettys, bulkheads, oil terminals, shipyards, marinas, dams, fish farms, sewage plants, dredging, pier and dock facilities, and artificial reefs and islands.

Technicians assist in estimating costs, drafting, earthmoving computations, maintaining and operating power equipment, ordering materials and supplies, and surveying. The technician is responsible for the performance of workers in his charge and inspects the work for quality and conformance to the specifications of the blueprints.

The marine construction technician will be the liaison between the skilled worker and the engineers in charge.

A person successfully completing the program should have no problem qualifying for such positions as Engineering Aide, Inspector, Surveyor, Cost Estimator, Dredging Chief, Field Draftsman, Instrumentman, or Maintenance Supervisor, to name a few.

# MARINE CONSTRUCTION ENGINEERING TECHNOLOGY

## FIRST QUARTER

| | | Hours Per Week | | | Quarter Hours Credit |
|---|---|---|---|---|---|
| | | Class | Lab | Shop | |
| T-MAT | 101-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MSC | 134-C—Marine Welding | 0 | 0 | 3 | 1 |
| T-MSC | 139—Marine Construction Rigging | 2 | 0 | 3 | 3 |
| T-MSC | 140—Marine Construction Equipment I | 3 | 0 | 3 | 4 |
| T-ENG | 101—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MSC | 150—Marine Equipment Operation and Maintenance I | 1 | 0 | 6 | 3 |
| T-CFT | 114—Scuba Diving (Optional) | (1) | (0) | (3) | (2) |
| | | 14 | 0 | 15 | 19 |

## SECOND QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-DFT | 118-C—Drafting and Blueprint Interpretation | 2 | 0 | 3 | 3 |
| T-MAT | 102-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-MSC | 135—Marine Welding I (Underwater Welding) | 0 | 0 | 3 | 1 |
| T-MSC | 141—Marine Construction Equipment II | 1 | 0 | 3 | 2 |
| T-ENG | 102—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-MSC | 151—Marine Equipment Operation and Maintenance II | 1 | 0 | 6 | 3 |
| T-MSC | 100-C—Small Boat Handling | 0 | 0 | 3 | 1 |
| | | 12 | 0 | 18 | 18 |

## THIRD QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-ENG | 103—Report Writing | 3 | 0 | 0 | 3 |
| T-MAT | 103-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-ELC | 107—Electricity I | 4 | 2 | 0 | 5 |
| T-MSC | 152—Marine Equipment Operation and Maintenance III | 1 | 0 | 6 | 3 |
| T-MSC | 106—Basic Navigation | 2 | 2 | 0 | 3 |
| T-MSC | 136—Marine Welding II (Underwater Cutting) | 0 | 0 | 3 | 1 |
| | | 15 | 4 | 9 | 20 |

## FOURTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-MSC | 147—Work Practice (Cooperative work/study—11 weeks) | 0 | 0 | 40 | 4 |

## FIFTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| T-PHY | 101—Physics: Properties of Matter | 3 | 2 | 0 | 4 |
| T-CIV | 101—Surveying I | 2 | 0 | 6 | 4 |
| T-CIV | 216—Strength of Marine Construction Materials | 3 | 2 | 0 | 4 |
| T-MSC | 153—Marine Equipment Operation and Maintenance IV | 0 | 0 | 6 | 2 |
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| | | 14 | 4 | 12 | 20 |

UNDER REVISION

SIXTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-PHY | 102—Physics: Work, Energy and Power | 3 | 2 | 0 | 4 |
| T-MAT | 201-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| T-CIV | 219-C—Steel and Timber Construction | 3 | 0 | 3 | 4 |
| T-MSC | 154—Marine Equipment Operation and Maintenance V | 0 | 0 | 3 | 1 |
| T-CIV | 201-C—Properties of Engineering Materials | 3 | 4 | 0 | 5 |
| | | 17 | 6 | 6 | 22 |

SEVENTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-PHY | 111—Physics: Mechanical Engineering | 3 | 0 | 0 | 3 |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| T-MSC | 148—Marine Construction Engineering Management | 3 | 0 | 0 | 3 |
| T-MSC | 149—Marine Construction Techniques | 2 | 0 | 9 | 5 |
| T-CIV | 114—Structural Related Statics | 5 | 0 | 0 | 5 |
| T-MSC | 155—Marine Equipment Operation and Maintenance VI | 0 | 0 | 3 | 1 |
| | | 16 | 0 | 12 | 20 |

## MARINE CONSTRUCTION ENGINEERING TECHNOLOGY

### COURSE DESCRIPTIONS BY QUARTERS

FIRST QUARTER

**T-Mat 101-C—Technical Mathematics:** The general area of basic mathematical concepts is presented, including common and decimal fractions, squares and square roots. The essential elements of algebra are also presented, including: positive and negative numbers, algebraic terminology, polynomials, exponents, scientific notation and powers of 10, grouping symbols, first degree and literal equations. Use of the slide rule is introduced at the beginning of this course. The application of principles learned is stressed in practical problems.

Prerequisite: None

**T-Msc 134-C—Marine Welding:** Welding demonstrations by the instructor and practice by students in the welding shop. Metallurgy of welding discussed. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding and flame cutting. Emphasis on electric arc and gas welding methods applicable to mechanical repair work. Brazing also covered.

Prerequisite: None

**T-Msc 139—Marine Construction Rigging:** Fibers, synthetics, and wire ropes are studied with emphasis on strength, proper handling, and stowage. The types of splicing used in fiber and wire slings will be demonstrated. Block and tackle combinations and mathematical formulas used to lift given weights will be taught in this course.

Prerequisite: None

**T-Msc 140—Marine Construction Equipment I:** A course introducing the student to the operation, maintenance, and repair of the mechanical, electrical, and internal combustion equipment normally used in the marine construction field. Of particular interest to the student is the care and maintenance of the various gasoline and diesel engines used to operate pumps, compressors, lighting systems, and generators. Operation and maintenance of pumps and hydraulic systems used in dredging operations is also required in this course.

Prerequisite: None

**T-Eng 101—Grammar and Composition:** This course is designed as a review of the elements of grammar. Exercises involve parts of speech, sentences, punctuation and mechanics, usage and style, spelling, and composition.
Prerequisite: None

**T-Msc 150—Marine Equipment Operation and Maintenance I:** Among the more important duties of the construction technician is assuring that the various equipment used in the operations is in a state of readiness. Much valuable time and money is lost by a firm which experiences breakdown of its equipment. Emphasis is placed upon the importance of a comprehensive and calculated maintenance program. The technician will also from time to time be called upon to operate a piece of equipment to teach an employee or to "fill in" in the event of the absence of an operator. The student completing this course will have the knowledge and expertise to operate almost any piece of equipment used in marine construction.
Prerequisite: None

**T-Cft 114—Scuba Diving (Optional):** A course designed to familiarize the student with the use of scuba gear, diving hazards, and diving physiology. Practical dives and routine vessel inspections and minor underwater repairs will be a part of this course.
Prerequisite: None

**SECOND QUARTER**

**T-DFT 118-C—Drafting and Blueprint Interpretation:** Basic drafting techniques are covered to provide a working knowledge of drafting as a tool for communicating ideas. Reading and interpreting of blueprints is emphasized.
Prerequisite: None

**T-Mat 102-C—Technical Mathematics:** This is a continuation of T-Mat 101-C. Numerical trigonometry is introduced in this course and includes right triangles and radian measure of angles. A working knowledge of numerical computations is acquired, utilizing logarithms in conjunction with the slide rule. Linear graphs, simultaneous equations and determinants are also introduced.
Prerequisite: T-Mat 101C

**T-Msc 135—Marine Welding I (Underwater Welding):** Underwater welding and cutting demonstrations by instructor and limited practice by students. This course is designed to familiarize the students with types of equipment, safety required, efficiency, cost of operations, and to stress the importance of being a qualified welder before taking the task of underwater welding, cutting, or burning. Emphasis will be placed on safety because of the hazards using extreme voltage and amperage around, above, and below the surface of fresh and salt water.
Prerequisite: T-Msc 134-C

**T-Msc 141—Marine Construction Equipment II:** A continuation of Mce I with an introduction to the various pumping systems used on marine construction "rigs." Auxiliary equipment such as generators and lighting equipment will also be discussed. Hydraulics and compressors are covered in detail.
Prerequisite: T-Msc 140

**T-Eng 102—Grammar and Composition:** This course is designed to orient students in using a library, learning to use the dictionary, and preparing the term paper. Attention is given to acquaintanceship with magazines and other publications. Writing assignments are frequent.
Prerequisite: T-Eng 101

**T-Msc 151—Marine Equipment Operation and Maintenance II:** A continuation of Marine Equipment Operation and Maintenance I with emphasis on operation and maintenance of the winches used in marine construction.
Prerequisite: None

T-Msc 100-C—Small Boat Handling: A practical course in the operation and handling of small boats. Includes a comprehensive study of safety on the water. Students will launch, pilot and recover a small boat and be instructed on trailering small boats on the highway. Students will themselves maintain boats and their engines.

Prerequisite: None

THIRD QUARTER

T-Eng 103—Report Writing: The fundamentals of English are utilized as a background for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must relate to the student's specific curriculum.

Prerequisite: T-Eng 102

T-Mat 103-C—Technical Mathematics: This is a continuation of T-Mat 102-C. More advanced algebraic subjects are presented, including: Special products, factoring, algebraic fractions, exponents and radicals, vector and phasor algebra, quadratic equations, graphs of quadratics, maximum and minimum, and imaginary numbers. Measurements and computations involving areas and volumes of regular figures and solids are introduced as well as trigonometric functions of oblique triangles.

Prerequisite: T-Mat 102-C

T-Elc 107—Electricity I: Introduction to basic theories and principles of electricity. Electrostatics, basic electric units, symbols, Ohm's Law, basic DC circuits, power, DC sources, and complex circuits are major parts of the course. Practical applications are stressed.

Prerequisite: None

T-Msc 152—Marine Equipment Operation and Maintenance III: A continuation of Marine Equipment Operation and Maintenance. II with emphasis on crane operation and maintenance. During this course, the crane will be entirely dismantled and reassembled to give the student complete knowledge of the working parts of the crane. Digging or dredging with the "clam-shell" bucket will also be demonstrated and practiced during this time.

Prerequisite: None

T-Msc 106—Basic Navigation: Theory of navigation with a comprehensive study of the compass, compass error, and its applications, various types of charts, plotting, piloting, navigation aids, buoys, lights, and ocean currents. Theory and practical application of ship board procedures and seamanship.

Prerequisite: None

T-Msc 136—Marine Welding II (Underwater Cutting): Underwater welding and cutting demonstrations by instructor and limited practice by students. This course is designed to familiarize the students with types of equipment, safety required, efficiency, cost of operations, and to stress the importance of being a qualified welder before taking the task of underwater welding, cutting, or burning. Emphasis will be placed on safety because of the hazards using extreme voltage and amperage around, above, and below the surface of fresh and salt water.

Prerequisite: T-Msc 135

FOURTH QUARTER

T-Msc 147—Work Practice (Cooperative work/study—11 weeks): Intermediate work experience assisting journeymen on marine construction projects such as power plants, bridges, sea walls, jettys, bulkheads, oil terminals, pier and dock facilities, artificial reefs and islands, shipyards, marinas, dams, sewage plants, fish farms, and dredging. Students will be expected to work in marine related industry for the eleven week period in order to receive course credit.

Prerequisite: None

## FIFTH QUARTER

**T-Psy 206-C—Applied Psychology:** A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings, and emotions are considered with practicular reference to on-the-job problems. Other topics investigated are employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None

**T-Phy 101—Physics: Properties of Matter:** A fundamental course covering several basic principles of physics. The divisions included are solids and their characteristics, liquids in motion, gas laws and applications. Laboratory experiments and specialized problems dealing with these topics are part of this course.
Prerequisite: None

**T-Civ 101—Surveying I:** Care and use of instruments; theory and practice of plane surveying including taping, differential and profile leveling, transit, stadia, and transit-tape surveys.
Prerequisite: T-Mat 101-C

**T-Civ 216—Strength of Marine Construction Materials:** Fundamental stress and strain relationship; torsion; shear and bending moments; stresses and deflections in beams; introduction to statically indeterminate beams; columns; combined stresses.
Prerequisite: None

**T-Msc 153—Marine Equipment Operation and Maintenance IV:** A continuation of Marine Equipment Operation and Maintenance III with emphasis on the operation and maintenance of the suction dredge. Students will be taught to set-up and pipe material away from the site of dredging operation during this period.
Prerequisite: None

**T-Eng 204—Oral Communication:** A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement in interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

## SIXTH QUARTER

**T-Phy 102—Physics: Work, Energy and Power:** Major areas covered in this course are work, energy, and power. Instruction includes such topics as statics, forces, center of gravity, and dynamics. Units of measurement and their applications are a vital part of this course. A practical approach is used in teaching students the use of essential mathematical formulas.
Prerequisite: None

**T-Mat 201-C—Technical Mathematics:** A continuation of T-Mat 103-C. Advanced algebraic operations are introduced, including a study of equations and trigonometric functions. Selected areas of analytic geometry are studied involving graphic interpretation of functional relationships. The course is designed primarily as a foundation for a first course in calculus.
Prerequisite: T-Mat 103-C

**T-Soc 102-C—Principles of Sociology:** An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effects of social life on human personality and behavior.
Prerequisite: None

T-Civ 219-C—Steel and Timber Construction: Analysis and basic design of steel beams, tension members, columns, and riveted, high strength bolted, welded connections; study of plate girders, industrial building roofs and vents, continuous spans, lightweight steel construction; use of American Institute of Steel Construction Manual; introduction to rigid frames and plastic design in steel. Design of timber members and their connections. Field inspection trips.
Prerequisite: None

T-Msc 154—Marine Equipment Operation and Maintenance V: A continuation of Marine Equipment Operation and Maintenance IV with emphasis on the pumps, air compressors, and generators used in marine construction programs.
Prerequisite: None

T-Civ 201-C—Properties of Engineering Materials: Study and testing of the properties of ferrous and non-ferrous metals, timber, stone, clay products, bituminous cementing materials and plastics; load and strain measurements; behavior of materials under load; qualities other than strength; control of the properties of the materials; non-destructive tests.
Prerequisite: T-Civ 216

## SEVENTH QUARTER

T-Phy 111—Physics: Mechanical Engineering: This course is designed to acquaint the student with the various mechanical devices and gear trains that are part of marine construction equipment. Torsion formulae and gear ratio formulae are also covered.
Prerequisite: None

T-Soc 206—American Institutions: A study of the effect of American social, economic, political, religious and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national and global problems viewed in the light of our political and economic heritage.
Prerequisite: None

T-Msc 148—Marine Construction Engineering Management: A course designed to acquaint the student with the many local, state, and federal laws pertaining to the employment of seamen and other marine construction personnel. Safety laws, building codes, and labor relations are also studied in this course.
Prerequisite: None

T-Msc 149—Marine Construction Techniques: During the sixth quarter, the second year student will put to practical use what he has learned in the classroom. The student will discuss a project with his instructors, do the "lay-out", estimate the materials and equipment needed and proceed as if it were a regular engineering contract. It is anticipated that for at least 4-5 years these projects will consist of dredging, bulkhead construction, pier building, etc., on the riverfront section of the school's campus.
Prerequisite: None

T-Civ 114—Structural Related Statics: Forces, resultants, and types of force systems; moments, equilibrium of coplanar forces by analytical and graphic methods; stresses and reactions in simple structures; equilibrium of forces in space, static and kinetic friction; center of gravity, centroids, and moment of inertia.
Prerequisites: T-Phy 102, T-Mat 102C

T-Msc 155—Marine Equipment Operation and Maintenance VI: A continuation of Marine Equipment Operation and Maintenance V and review of all the equipment studied thus far.
Prerequisite: None

## MARINE ELECTRONICS

PURPOSE:

Research vessels, fishing fleets and pleasure craft have become highly dependent on electronic equipment in order to perform and successfully complete assigned missions and tasks. This dependency is increasing daily and shall continue to do so, since the need for concise, accurate and specific data concerning the ocean, navigation and communications is increasing as rapidly as the population.

Electronic industries concerned with marine instrumentation are constantly striving to produce more accurate and reliable equipment. As a result of this effort has come more sophisticated equipment, thus, demanding more competent Marine Electronic Technicians.

This demand for competent Marine Electronic Technicians has not been met on any level, i.e., research and development, manufacturing, installation, calibration and general marine instrument maintenance.

Due to the nature and environmental conditions of marine instrumentation, the Marine Electronic Technician must utilize special talents and abilities to carry out his daily work in installation, calibration and maintenance.

This curriculum is designed to provide the basic fundamentals and working knowledge of marine instrumentation and encourage the development of individual talents that will enable the technician to successfully cope with established state of the art systems encountered in marine laboratories aboard ship and pleasure craft, as well as land based facilities.

Employment may be found with existing marine electronic firms, fishing fleets, shipbuilders, manufacturers of marine electronics equipment, ocean going research vessels, and agencies involved in water quality and pollution control.

It is expected that students participating in this program will have successfully completed two years of study at a technical institute in electronics or instrumentation programs or possess the equivalent of two years in the electronics or instrumentation fields.

## MARINE ELECTRONICS

| SUMMER QUARTER | | Hours Per Week Class | Lab | Shop | Quarter Hours Credit |
|---|---|---|---|---|---|
| T-MSC | 130—Oceanography and Oceanographic Instrumentation | 2 | 6 | 0 | 5 |
| T-MSC | 105—Shipboard Electro-Mechanical Basic Seamanship | 0 | 2 | 0 | 1 |
| T-ELN | 102—Electronic Navaid Systems | 3 | 6 | 0 | 6 |
| T-ELN | 103—Small Craft Electronics and Electrical Systems | 2 | 2 | 0 | 3 |
| T-ELN | 104—Shipboard Electro-Mechanical Systems | 2 | 4 | 0 | 4 |
| | | 9 | 20 | 0 | 19 |

**T-Msc 130—Oceanography and Oceanographic Instrumentation:** A general description of the ocean, its geologic features, its chemical composition, its plant and animal life, and its physical characteristics. An introduction to oceanographic and geophysical survey techniques and oceanographic instrumentation including data acquisition and storage with emphasis on acoustic systems, S.T.D. systems and water quality instrumentation. Students will receive practical experience in set up, operation, maintenance and trouble shooting of instrumentation in the shop and aboard ship.

Prerequisite: None

**T-Msc 105—Shipboard Orientation and Basic Seamanship:** An introduction to ships and requirements of shipboard life. Shipboard nomenclature, ship construction and water, fuel, heating, air and propulsion systems will be studied. Safety at sea will be stressed and fire, man overboard, and abandon ship drills will be practiced. Students will receive practical instruction in rules of the road, small boat handling and marlinespike seamanship.

Prerequisite: None

**T-Eln 102—Electronic Navaid Systems:** A study of long and short range navigation equipments and systems, i.e., theory of operation, installation and maintenance.

Prerequisite: None

**T-Eln 103—Small Craft Electronics and Electrical Systems:** A study of general electronic and electrical systems employed aboard pleasure craft and fishing fleets; i.e., Loran, R.D.F., fish finders, communication equipment and small craft electrical power systems.

Prerequisite: None

**T-Eln 104—Shipboard Electro-Mechanical Systems:** A study of power generation and regulation, motors, generators and MG sets and emergency systems. Pneumatic and hydraulic principles, winches and hoists. Servo systems, electric and hydraulic.

## MARINE LABORATORY TECHNOLOGY

Graduates of this program will serve in a technical capacity in oceanographic and other marine-oriented laboratories assisting professional scientists with basic research in biology, geology, physics and chemistry. The ocean science technician will also participate in shipboard surveys whenever such occasion becomes necessary; will be familiar with the kinds of measuring and sampling equipment used in oceanography; will operate the shipboard laboratory, will master techniques and methods commonly employed in oceanographic operations.

The technician will inherit much of the responsibility associated with the laboratory, (through a working alliance with the professional scientist), by relieving the scientist from many of the technical obstacles standing in the path of pure research.

# MARINE LABORATORY TECHNOLOGY

| FIRST QUARTER | | Hours Per Week Class | Lab | Shop | Quarter Hours Credit |
|---|---|---|---|---|---|
| T-MAT | 101-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-ENG | 101—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-BIO | 131—Marine Invertebrate Zoology I | 1 | 4 | 0 | 3 |
| T-MSC | 107—Introduction to Oceanography | 3 | 0 | 0 | 3 |
| T-MSC | 134—Marine Welding* | 1 | 0 | 3 | 2 |
| T-MSC | 120—Small Boat Seamanship** | (0) | (2) | (3) | (2) |
| T-PME | 101—Marine Engines I** | 0 | 2 | 3 | 2 |
| T-MSC | 117—Practical Experience I | 0 | 0 | 3 | 1 |
| | | 13 | 6 | 9 | 19 |

*The above course marked with one asterisk (*) is to be taken during the First Quarter or either in the Second Quarter.

**Either of the two courses marked with two asterisks (**) are to be taken during the First Quarter. The remaining course marked with two asterisks (**) is to be taken during the Third Quarter.

| SECOND QUARTER | | | | | |
|---|---|---|---|---|---|
| T-MAT | 102-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-ENG | 102—Grammar and Composition | 3 | 0 | 0 | 3 |
| T-BIO | 132—Marine Invertebrate Zoology II | 1 | 4 | 0 | 3 |
| T-MSC | 201—Aquarium Systems | 1 | 4 | 0 | 3 |
| T-MSC | 134—Marine Welding* | (1) | (0) | (3) | (2) |
| T-MSC | 111—Net Construction and Repair*** | 0 | 2 | 3 | 2 |
| T-CHM | 101—Introduction to Chemistry*** | (2) | (0) | (3) | (3) |
| T-MSC | 118—Practical Experience II | 0 | 0 | 3 | 1 |
| | | 10 | 10 | 6 | 17 |

*See First Quarter

***Either of the two courses marked with three asterisks (***) are to be taken during the Second Quarter. The remaining course marked with three asterisks is to be taken during the Third Quarter.

| THIRD QUARTER | | | | | |
|---|---|---|---|---|---|
| T-MAT | 103-C—Technical Mathematics | 5 | 0 | 0 | 5 |
| T-PHY | 101—Physics: Properties of Matter | 3 | 2 | 0 | 4 |
| T-HED | 120—First Aid | 2 | 0 | 0 | 2 |
| T-PHO | 110—Introduction to Photography | 1 | 0 | 3 | 2 |
| T-PME | 101—Marine Engines I** | (0) | (2) | (3) | (2) |
| T-MSC | 111—Net Construction and Repair*** | (0) | (2) | (3) | (2) |
| T-CHM | 101—Introduction to Chemistry*** | 2 | 0 | 3 | 3 |
| T-MSC | 120—Small Boat Seamanship** | 0 | 2 | 3 | 2 |
| | | 13 | 4 | 9 | 18 |

**See First Quarter
***See Second Quarter

| FOURTH QUARTER | | | | | |
|---|---|---|---|---|---|
| T-MSC | 108—Classical Oceanographic Instrumentation | 2 | 2 | 0 | 3 |
| T-BIO | 110—Field Biology I | 1 | 4 | 0 | 3 |
| T-CHM | 109—Chemical Analysis of Natural Waters | 1 | 4 | 0 | 3 |
| T-EDP | 201—Introduction to Computer Programming | 1 | 4 | 0 | 3 |
| T-MSC | 119—Practical Experience III | 0 | 0 | 6 | 2 |
| T-PHY | 102—Physics: Work, Energy, Power | 3 | 2 | 0 | 4 |
| | | 8 | 16 | 6 | 18 |

FIFTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-ENG | 103—Report Writing | 3 | 0 | 0 | 3 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| T-BIO | 111—Microbiology | 1 | 4 | 0 | 3 |
| T-GEO | 101—Marine Geology | 3 | 2 | 0 | 4 |
| T-ELC | 107—Electricity I | 4 | 0 | 3 | 5 |
| T-MAT | 211—Basic Statistics | 5 | 0 | 0 | 5 |
| | | 19 | 6 | 3 | 23 |

SIXTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| T-ELC | 108—Electricity II | 4 | 0 | 3 | 5 |
| T-MSC | 216—Oceanographic Data Processing | 2 | 4 | 0 | 4 |
| T-MSC | 220—Practical Experience IV | 0 | 2 | 3 | 2 |
| T-PHO | 210—Advanced Photography | 2 | 2 | 0 | 3 |
| | | 14 | 8 | 6 | 20 |

SEVENTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| T-CHM | 246—Chemical Analysis of Natural Waters II | 1 | 4 | 0 | 3 |
| T-ELC | 109—Electricity III | 4 | 0 | 3 | 5 |
| T-BIO | 210—Field Biology II | 1 | 4 | 0 | 3 |
| T-MSC | 221—Practical Experience V | 0 | 0 | 3 | 1 |
| T-MSC | 225—Biological Analysis of Natural Waters | 1 | 4 | 0 | 3 |
| | | 10 | 12 | 6 | 18 |

* = 1st and 2nd Quarter
** = 1st and 3rd Quarter
*** = 2nd and 3rd Quarter

## MARINE LABORATORY TECHNOLOGY

FIRST QUARTER

T-Mat 101-C—Technical Mathematics: The general area of basic mathematical concepts is presented, including common and decimal fractions, squares and square roots. The essential elements of algebra are also presented, including: positive and negative numbers, algebraic terminology, polynominals, exponents, scientific notation and powers of 10, grouping symbols, first degree and literal equations. Use of the slide rule is introduced at the beginning of this course. The application of principles learned is stressed in practical problems.
Prerequisite: None

T-Eng 101—Grammar and Composition: Designed to aid the student in the improvement of self-expression in both writing and speaking. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English, grammar and written composition in their day to day situations.
Prerequisite: Satisfactory evidence that admission requirements have been met

T-Bio 131—Marine Invertebrate Zoology I: A practical course designed to acquaint the student with marine organisms common to the North Carolina Coast; their classification and natural history. Emphasis will be on collection methods and identification of marine specimens. The student will be required to complete a collection on marine organisms identified to species.
Prerequisite: None

T-Msc 107—Introduction to Oceanography: A general description of the oceans, their geology, chemistry, physics, and biology. A survey of methods and techniques used by scientists in studying the oceans.
Prerequisite: None

T-Msc 134—Marine Welding: Welding demonstrations by the instructor and practice by students in the welding shop. Metallurgy of welding discussed. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding and flame cutting. Emphasis on electric arc and gas welding methods applicable to mechanical repair work.
Prerequisite: None

T-Msc 120—Small Boat Seamanship: The course is designed to indoctrinate the student in the various aspects of the skills of small boat seamanship; minor routine maintenance, repair, and handling of equipment; lifeboat operations, survival techniques; emergency drills and procedures; i.e., fire, rescue, heavy weather, safety measures; line handling, docking and undocking, and secure mooring of a small boat under light and heavy weather conditions; and, lines and rope.
Prerequisite: None

T-Pme 101—Marine Engines I: A basic course introducing the student to basic construction of internal combustion engines of the reciprocating types. Hand tools and power tools, basic maintenance and repair of related equipment, including starters, water pumps, and generators.
Prerequisite: None

T-Msc 117—Practical Experience I: This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.
Prerequisite: None

SECOND QUARTER

T-Mat 102-C—Technical Mathematics: This is a continuation of T-Mat 101-C. Numerical and trigonometry is introduced in this course and includes right triangles and radian measure of angles. A working knowledge of numerical computations is acquired, utilizing logarithms in conjunction with the slide rule. Linear graphs, simultaneous equations and determinants are also introduced.
Prerequisite: T-Mat 101-C

T-Eng 102—Grammar and Composition: A continuation of T-Eng 101, Grammar and Composition, with emphasis on self-expression in business communications.
Prerequisite: T-Eng 101

T-Bio 132—Marine Invertebrate Zoology II: A continuation of T-Bio 131. Major invertebrate marine organisms will continue to be discussed. Laboratory work will involve collecting methods and identification of planktonic organisms. Laboratory assignments on selected marine invertebrates may be included. Various types of biological sampling gear will be discussed and demonstrated.
Prerequisite: None

T-Msc 201—Aquarium Systems: A comprehensive course which teaches the student the proper methods of setting up and maintaining healthy marine and fresh water aquaria. Emphasis is placed on water quality and animal management techniques.
Prerequisite: None

T-Msc 134—Marine Welding: Welding demonstrations by the instructor and practice by students in the welding shop. Metallurgy of welding discussed. Safe and correct methods of assembling and operating the welding equipment.

Practice will be given for surface welding and flame cutting. Emphasis on electric arc and gas welding methods applicable to mechanical repair work. Brazing also covered.
Prerequisite: None

T-Msc 111—Net Construction and Repair: Students will be instructed in the construction of the webbing used in building fishing gear. As the appropriate proficiency level is reached, they will be instructed in the repair of various types of fishing gear.
Prerequisite: None

T-Chm 101—Introduction to Chemistry: A basic introduction to elements, compounds, mixtures, symbols, formulas, equations, and weight reactions and solutions. In addition, the student will be introduced to basic laboratory equipment, and techniques.
Prerequisite: None

T-Msc 118—Practical Experience II: This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.
Prerequisite: None

## THIRD QUARTER

T-Mat 103-C—Technical Mathematics: This is a continuation of T-Mat 102-C. More advanced algebraic subjects are presented, including: special products, factoring, algebraic fractions, exponents and radicals, vector and phasor algebra, quadratic equations, graphs of quadratics, maximum and minimum, and imaginary numbers. Measurements and computations involving areas and volumes of regular figures and solids are introduced as well as trigonometric functions of oblique triangles.
Prerequisite: T-Mat 102-C

T-Phy 101—Physics: Properties of Matters: A fundamental course covering basic principles of physics. The divisions included are solids and their characteristics, liquids at rest and in motion, gas laws and applications. Laboratory experiments and specialized problems dealing with these topics are part of this course.
Prerequisite: None

T-Hed 120—First Aid: This course will teach the students First Aid to enable them to successfully cope with the every day injuries of the marine environment. Course coverage will range from minor cuts and burns to the treatment of shock. The course will also include what to do in case of injury by dangerous and poisonous marine organisms.
Prerequisite: None

T-Pho 110—Introduction to Photography: A basic course in the photographing of objects, and in developing film and prints. Students will study the taking of pictures with the use of natural lighting.
Prerequisite: None

T-Pme 101—Marine Engines I: A basic course introducing the student to basic construction of internal combustion engines of the reciprocating types. Hand tools and power tools, basic maintenance and repair of related equipment, including starters, water pumps, and generators.
Prerequisite: None

T-Msc 111—Net Construction and Repair: Students will be instructed in the construction of the webbing used in building fishing gear. As the appropriate proficiency level is reached, they will be instructed in the repair and use of various types of fishing gear.
Prerequisite: None

**T-Chm 101—Introduction to Chemistry:** A basic introduction to elements, compounds, mixtures, symbols, formulas, equations, and weight relations in reactions and solutions. In addition, the student will be introduced to basic laboratory equipment, and techniques.
Prerequisite: None

**T-Msc 120—Small Boat Seamanship:** The course is designed to indoctrinate the student in the various aspects of the skills of small boat seamanship; minor routine maintenance, repair, and handling of equipment; lifeboat operations, survival techniques; emergency drills and procedures; i.e., fire, rescue, heavy weather, safety measures; line handling, docking and undocking, and secure mooring of a small boat under light and heavy weather conditions; and, lines and rope.
Prerequisite: None

## FOURTH QUARTER

**T-Msc 108—Classical Oceanographic Instrumentation:** Basic oceanographic instrumentation is introduced via demonstration with emphasis on student utilization of the equipment. Emphasis is also placed on equipment maintenance and repair.
Prerequisite: None

**T-Bio 110—Field Biology I:** A field course in which the students will be involved in doing a biological survey of the Cape Fear River Estuary. Collection methods and data compilation will be taught.
Prerequisite: None

**T-Chm 109—Chemical Analysis of Natural Waters:** Essentially a laboratory course introducing the techniques and equipment used in the analysis of sea-water. The student will carry out determinations of chlorinity, salinity, dissolved oxygen, phosphate, nitrate, and silicate.
Prerequisite: T-Chm 101

**T-Edp 201—Introduction to Computer Programming:** A course relating all work to specific problems in the marine technical field, such as development of data. An introduction to programming, developing the basic systems of numbers other than base 10, and the arranging and developing of data to form simple programming techniques.
Prerequisite: None

**T-Msc 119—Practical Experience III:** This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.
Prerequisite: None

**T-Phy 102—Physics: Work, Energy, Power:** Major areas covered in this course are work, energy, and power. Instruction includes such topics as statics forces, center of gravity and dynamics, Units of measurement and their teaching students the use of essential mathematic formulas.
Prerequisites: T-Phy 101, T-Mat 101-C

## FIFTH QUARTER

**T-Eng 103—Report Writing:** The fundamentals of English are utilized as a background for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.
Prerequisite: None

T-Psy 206-C—Applied Psychology: A study of the principles of physchology that will be of assistance in the understanding of interpersonal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None

T-Bio 111—Microbiology: A survey of the principles and laboratory techniques employed in the study of microorganisms. The ecology of microbes in aquatic biology will be stressed.
Prerequisite: None

T-Geo 101—Marine Geology: The study and identification of minerals and other physical features of the ocean floor. This course will include the identification of rocks and other mineral samples obtained from the ocean bottom. The physical characteristics of the ocean floor will be studied in depth.
Prerequisite: None

T-Elc 107—Electricity I: Introduction to basic theories and principles of electricity. Electrostatics, basic electric units, symbols, Ohm's Law, basic DC circuits, power, DC sources, and complex circuits are major parts of the course. Practical applications are stressed.
Prerequisite: None

T-Mat 211—Basic Statistics: The student is introduced to the terminology and mathematical notation of statistics. Topics of discussion include the description of numeric distributions (graph, mean, variance, and standard, deviation, and probability).
Prerequisite: T-Mat 103

## SIXTH QUARTER

T-Eng 204—Oral Communication: A study of basic concepts and principles of oral communications to enable the student to communicate with others. Emphasis is placed on the speaker's attitude, improving diction, voice, and the application of particular techniques of theory to correct speaking habits and to produce effective oral presentation. Particular attention given to conducting meetings, conferences, and interviews.
Prerequisite: None

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavor in relation to other men, the general laws affectng the organization of such relationships and the effects of social life on human personality and behavior.
Prerequisite: None

T-Elc 108—Electricity II: Introduction to alternating current theory, simple generators, sine wave analysis, induction, capacitance, reactance impedence, phase relations, etc. A continuation of T-Elc 107 stressing practical applications and industry practices.
Prerequisite: T-Elc 107

T-Msc 216—Oceanographic Data Processing: Data acquisition and reduction with stress being placed on the conversion of raw field data to useable laboratory data.
Prerequisite: T-Msc 215

**T-Msc 220—Practical Experience IV:** This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.
Prerequisite: None

**T-Pho 210—Advanced Photography:** This course will go into greater detail of black and white photography, basics of underwater photography, and introduction to color slide developing.
Prerequisite: T-Pho 110

## SEVENTH QUARTER

**T-Soc 206—American Institutions:** A study of the effect of American social, economic, political, religious, and educational institutions have upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.
Prerequisite: None

**T-Chm 246—Chemical Analysis of Natural Waters II:** A continuation of T-Chm 108 in which the students will carry out specialized analyses with particular emphasis on the techniques of atomic absorption spectrophotometry.
Prerequisite: T-Chm 108

**T-Elc 109—Electricity III:** Continues T-Elc 108 circuit analysis. Study of the basic principles and use of common instruments and electrical measuring devices. Some basic electronics is inevitable when investigating such a subject. Practical applications and electrical code requirements are stressed.
Prerequisite: T-Elc 108

**T-Bio 210—Field Biology II:** A continuation of field biological survey techniques begun in T-Bio 110.
Prerequisite: None

**T-Msc 221—Practical Experience V:** This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.
Prerequisite: None

**T-Msc 225—Biological Analysis of Natural Waters:** A survey course concerning pollution of nearshore and estuarine environments. Effects of changes in the physical and chemical parameters of water on marine and freshwater organisms will be discussed. Lab work will involve learning techniques used in analyzing water for pollution and observing the effects of pollution on aquatic organisms.
Prerequisite: T-Bio 111

## MARINE TECHNOLOGY

Marine scientific advances of the past decade have led to the development of a strong marine technician training program for North Carolina. A thorough study of marine occupations has shown a great need for personnel trained in the use of modern oceanographic and fishing equipment and techniques. The technological developments of the last ten years have made available to marine scientists the new sophisticated equipment, such as electronic devices for navigation, electronic fish-finders, new devices for data acquisition and reduction, and new methods of carrying out oceanographic research at sea.

As in other facets of our mechanical life, the methods used in past years do not suffice today. Efficiency in the use of all the modern tools available is necessary for success in today's marine science operations.

The Marine Technology program includes a curriculum with a strong base in the science and mathematics needed to meet the challenging requirments of the marine research technician. This two-year curriculum will provide the student with a first-hand opportunity to become proficient in the knowledge and skills of the field. Practical training and cooperative research will be conducted aboard the school's research vessel, The Advance II, which is docked at the Cape Fear Technical Institute at Wilmington, North Carolina.

Each student will be assigned daily duties in maintaining the training vessel in addition to classroom instruction and will be directly involved in the operation of the ship and all research activities on all training cruises.

Graduates of this curriculum may perform experiments and data acquisition and reduction activities associated with the marine laboratory; may operate radar, loran, direction finders, ship radio, depth recorders, fish-finders, and the gyro compass. In addition, they may participate in fish-dragging operations, use of electronic devices, and perform the daily routine tasks necessary for the proper maintenance of the vessel. Marine Technology graduates will have received instruction in navigation, oceanography, marine engineering, and marine biology. Graduates of this curriculum may find job opportunities with the U. S. Navy Oceanographic Office, the U. S. Geodetic Survey, research foundations, private survey companies, marine salvage companies, marine construction companies, fish-processing plants, marinas, boat yards or private fishing concerns. They may also find employment on towboats and yachts.

Prerequisites: Admission requirements and at least one year of high school algebra.

## MARINE TECHNOLOGY

| FIRST QUARTER | | Hours Per Quarter Class | Lab | Shop | Quarter Hours Credit |
|---|---|---|---|---|---|
| T-ENG | 101—Grammar and Composition | 33 | 0 | 0 | 3 |
| T-MAT | 101-C—Technical Mathematics | 55 | 0 | 0 | 5 |
| T-BIO | 131—Marine Invertebrate Zoology I | 11 | 44 | 0 | 3 |
| T-MSC | 107—Introduction to Oceanography | 33 | 0 | 0 | 3 |
| T-MSC | 129—Seamanship and Power Boat Handling* | (0) | (22) | (33) | (2) |
| T-PSY | 206-C—Applied Psychology | 33 | 0 | 0 | 3 |
| T-PME | 101—Marine Engines I* | 0 | 22 | 33 | 2 |
| T-MSC | 121—Ship and Marine Equipment Repair I | 0 | 0 | 33 | 1 |
| | | | | | 20 |
| T-SHI | 101—Ship Experiences (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 221—Marine Projects | | As Earned | | As Earned |

*Either of the two courses marked with a single asterisk (*) are to be taken during the First Quarter. The remaining course marked with a single asterisk (*) is to be taken during the Third Quarter.

| SECOND QUARTER | | | | | |
|---|---|---|---|---|---|
| T-ENG | 102—Grammar and Composition | 33 | 0 | 0 | 3 |
| T-MAT | 102-C—Technical Mathematics | 55 | 0 | 0 | 5 |
| T-SOC | 102-C—Principles of Sociology | 33 | 0 | 0 | 3 |
| T-MSC | 111—Net Construction and Repair** | (0) | (22) | (33) | (2) |
| T-CHM | 101—Introduction to Chemistry** | 22 33 | 0 22 | 33 | 3 |
| T-BIO | 132—Marine Invertebrate Zoology II | 11 | 44 | 0 | 3 |
| T-HED | 120—First Aid*** | 22 | 0 | 0 | 2 |
| T-MSC | 122—Ship and Marine Equipment Repair II | 0 | 0 | 33 | 1 |
| | | | | | 20 |
| T-SHI | 102—Ship Experience (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 222—Marine Projects | | As Earned | | As Earned |

**Either of the two courses marked with two asterisks (**) are to be taken during the Second Quarter. The remaining course marked with two asterisks (**) is to be taken during the Third Quarter.

***The above course marked with three asterisks (***) is to be taken during the Second Quarter or either in the Fourth Quarter.

THIRD QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-MAT | 103-C—Technical Mathematics | 55 | 0 | 0 | 5 |
| T-PHY | 101—Physics: Properties of Matter | 33 | 22 | 0 | 4 |
| T-MSC | 129—Seamanship and Power Boat Handling* | 0 | 22 | 33 | 2 |
| T-SOC | 206—American Institutions***** | 33 | 0 | 0 | 3 |
| T-PME | 101—Marine Engines I* | (0) | (22) | (33) | (2) |
| T-MSC | 123—Ship and Marine Equipment Repair III | 0 | 0 | 33 | 1 |
| T-MSC | 111—Net Construction and Repair** | 0 | 22 | 33 | 2 |
| T-CHM | 101—Introduction to Chemistry** | (22) | (0) | (33) | (3) |
| T-MSC | 134—Marine Welding**** | (11) | (0) | (33) | (2) |
| | | | | | 17 |
| T-SHI | 103—Ship Experience (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 223—Marine Projects | | As Earned | | As Earned |

*See First Quarter

**See Second Quarter

****The above course marked with four asterisks (****) is to be taken during the Third Quarter or either in the Fourth Quarter.

*****The above course marked with five asterisks(*****) is to be taken during the Third Quarter or either in the Fourth Quarter.

FOURTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-HED | 120—First Aid*** | (22) | (0) | (0) | (2) |
| T-MSC | 112—Fishing Gear Construction | 0 | 22 | 33 | 2 |
| T-MSC | 101—Navigation I | 11 | 0 | 33 | 2 |
| T-BIO | 110—Field Biology I | 11 | 44 | 0 | 3 |
| T-MSC | 134—Marine Welding**** | 11 | 0 | 33 | 2 |
| T-MSC | 124—Ship and Marine Equipment Repair IV | 0 | 0 | 33 | 1 |
| T-CHM | 246—Chemical Analysis of Natural Waters | 11 | 44 | 0 | 3 |
| T-SOC | 206—American Institutions***** | (33) | (0) | (0) | (3) |
| | | | | | 13 |
| T-SHI | 104—Ship Experience (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 224—Marine Projects | | As Earned | | As Earned |

***—See Second Quarter

****—See Third Quarter

*****—See Third Quarter

FIFTH QUARTER

| | | | | | |
|---|---|---|---|---|---|
| T-MSC | 108—Classical Oceanographic Instrumentation | 22 | 22 | 0 | 3 |
| T-MSC | 212—Introduction to Data Acquisition | 22 | 22 | 0 | 3 |
| T-PHY | 102—Physics: Work, Energy, Power | 33 | 22 | 0 | 4 |
| T-MSC | 125—Ship and Marine Equipment Repair V | 0 | 0 | 33 | 1 |
| T-MSC | 113—Fishing Methods I | 0 | 22 | 33 | 2 |
| T-PME | 102—Marine Engines II | 11 | 0 | 33 | 2 |
| T-EDP | 201—Introduction to Computer Programming | 1 | 44 | 0 | 3 |
| | | | | | 18 |
| T-SHI | 105—Ship Experience (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 225—Marine Projects | | As Earned | | As Earned |

**SIXTH QUARTER**

| | | | | | |
|---|---|---|---|---|---|
| T-MSC | 102—Navigation II | 11 | 0 | 33 | 2 |
| T-ELC | 107-C—Electricity I | 22 | 22 | 0 | 3 |
| T-ENG | 103—Report Writing | 33 | 0 | 0 | 3 |
| T-MAT | 211—Basic Statistics | 55 | 0 | 0 | 5 |
| T-MSC | 205—Data Reduction Techniques | 22 | 22 | 0 | 3 |
| T-MSC | 126—Ship and Marine Equipment Repair VI | 0 | 0 | 33 | 1 |
| T-GEO | 101—Marine Geology | 33 | 22 | 0 | 4 |
| | | | | | 21 |
| T-SHI | 106—Ship Experience (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 226—Marine Projects | | As Earned | | As Earned |

**SEVENTH QUARTER**

| | | | | | |
|---|---|---|---|---|---|
| T-ENG | 204—Oral Communications | 33 | 0 | 0 | 3 |
| T-PME | 103—Marine Engines III | 0 | 22 | 33 | 2 |
| T-ELC | 108-C—Electricity II | 44 | 22 | 0 | 5 |
| T-MSC | 127—Ship and Marine Equipment Repair VII | 0 | 0 | 33 | 1 |
| T-DFT | 117—Drafting and Blueprint Reading | 33 | 0 | 33 | 4 |
| T-BIO | 210—Field Biology II | 11 | 44 | 0 | 3 |
| | | | | | 18 |
| T-SHI | 107—Ship Experience (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 227—Marine Projects | | As Earned | | As Earned |

**EIGHTH QUARTER**

| | | | | | |
|---|---|---|---|---|---|
| T-MSC | 114—Fishing Methods II | 0 | 22 | 33 | 2 |
| T-MSC | 204—Ocean Survey Equipment | 0 | 0 | 33 | 1 |
| T-ELC | 109-C—Electricity III | 33 | 22 | 0 | 4 |
| T-PME | 104—Marine Engines IV | 0 | 22 | 33 | 2 |
| T-MSC | 224—Chemical Oceanographic Sampling | 0 | 0 | 33 | 1 |
| T-PHO | 110—Introduction to Photography | 11 | 0 | 33 | 2 |
| T-MSC | 128—Ship and Marine Equipment Repair VIII | 3 | 0 | 33 | 1 |
| | | | | | 13 |
| T-SHI | 108—Ship Experience (Cruises) and/or | | As Earned | | As Earned |
| T-SHI | 228—Marine Projects | | As Earned | | As Earned |

*1st and 3rd Quarters
**2nd and 3rd Quarters
***2nd and 4th Quarters
****3rd and 4th Quarters
*****3rd and 4th Quarters

One week of Cruise (Ship Experience) = 60 hours Contact = 2 credits

## MARINE TECHNOLOGY

### COURSE DESCRIPTION BY QUARTERS

**FIRST QUARTER**

T-Eng 101—Grammar and Composition: Designed to aid the student in the improvement of self-expression in both writing and speaking. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic prin-

ciples of English, grammar and written composition in their day to day situations.

Prerequisite: Satisfactory evidence that admission requirements have been met.

T-Mat 101-C—Technical Mathematics: The general area of basic mathematical concepts is presented, including common and decimal fractions, squares and square roots. The essential elements of algebra are also presented, including: positive and negative numbers, algebraic terminology, polynominals, exponents, scientific notation and powers of 10, grouping symbols, first degree and literal equations. Use of the slide rule is introduced at the beginning of this course. The application of principles learned is stressed in practical problems.

Prerequisite: None

T-Bio 131—Marine Invertebrate Zoology I: A practical course designed to acquaint the student with marine organisms common to the North Carolina coast; their classification and natural history. Emphasis will be on collection methods and identification of marine specimens. The student will be required to complete a collection of marine organisms identified to species.

Prerequisite: None

T-Msc 107—Introduction to Oceanography: A general description of the oceans, their geology, chemistry, physics, and biology. A survey of methods and techniques used by scientists in studying the oceans.

Prerequisite: None

T-Msc 129—Seamanship and Power Boat Handling: The course is designed to indoctrinate the student in the various skills of deck seamanship; ship watertight design and integrity; minor routine maintenance and repair of ship and handling equipment; abandon ship and survival techniques; shipboard emergency drills and procedures, i.e., fire rescue; heavy weather; and safety measures; line handling; docking and undocking; and secure mooring and/or anchoring of a ship under light and heavy weather conditions; to teach the safe skillful, and seamanlike operation of power boats under varying wind, weather, and sea conditions. Emphasis is placed upon nautical terminology and nomenclature. Students will launch, operate, and recover power boats.

Prerequisite: None

T-Psy 206-C—Applied Psychology: A study of the principles of psychology that will be of assistance in the understanding of interpersonal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.

Prerequisite: None

T-Pme 101—Marine Engines I: A basic course introducing the student to basic construction of internal combustion engines of the reciprocating types. Hand tools and power tools, basic maintenance and repair of related equipment, including starters, water pumps, and generators.

Prerequisite: None

T-Msc 121—Ship and Marine Equipment Repair I: This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.

Prerequisite: None

T-Shi 101—Ship Experience: All students will receive sea experience aboard the school's vessels during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements

of chartering scientific agencies. Students will be rotated on various assignments. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.

Prerequisite: None

And/Or

T-Shi 221—Marine Projects: This special course will be required of all students whenever circumstances make it impossible for them to earn their complete Ship Experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience credit at all, and thereafter will commence one day later for each day cruised, up to ten days. Students who cruised ten days or more will not be required to take this course. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated, aboard the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.

Thus, any combination of Ship Experience and Marine Projects time will earn 1 credit.

Prerequisite: None

## SECOND QUARTER

T-Eng 102—Grammar and Composition: A continuation of T-Eng 101, Grammar and Composition, with emphasis on self-expression in business communications.

Prerequisite: T-Eng 101

T-Mat 102-C—Technical Mathematics: This is a continuation of T-Mat 101-C. Numerical trigonometry is introduced in this course and includes right triangles and radian measure of angles. A working knowledge of numerical computations is acquired, utilizing logarithms in conjunction with the slide rule. Linear graphs, simultaneous equations and determinants are also introduced.

Prerequisite: T-Mat 101-C

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effects of social life on human personality and behavior.

Prerequisite: None

T-Msc 111—Net Construction and Repair: Students will be instructed in the construction of the webbing used in building fishing gear. As the appropriate efficiency level is reached, they will be instructed in the repair of various types of fishing gear.

Prerequisite: None

T-Chm 101—Introduction to Chemistry: A basic introduction to elements, compounds, mixtures, symbols, formulas, equations, and weight relations in reactions and solutions. In addition, the student will be introduced to basic laboratory equipment, and techniques.

Prerequisite: None

T-Bio 132—Marine Invertebrate Zoology II: A continuation of T-Bio 121. Major invertebrate marine organisms will continue to be discussed. Laboratory work will involve collecting methods and identification of planktonic organisms. Laboratory assignments on selected marine invertebrate may be included. Various types of biological sampling gear will be discussed and demonstrated.

Prerequisite: None

T-Hed 120—First Aid: This course will teach the students First Aid to enable them to successfully cope with the every day injuries of the marine environment. Course coverage will range from minor cuts and burns to the treatment of shock. The course will also include what to do in case of injury by dangerous and poisonous marine organisms.

Prerequisite: None

T-Msc 122—Ship and Marine Equipment Repair II: This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.

Prerequisite: None

T-Shi 102—Ship Experience: All students will receive sea experience aboard the school's vessel during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements of chartering scientific agencies. Students will be rotated on various assignments. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.

Prerequisite: None

And/or

T-Shi 222—Marine Projects: This special course will be required of all students whenever circumstances make it impossible for them to earn their complete Ship Experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience at all, and thereafter will commence one day later for each day cruised, up to ten days. Students who cruised ten days or more will not be required to take this course. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated, aboard the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.
Thus any combination of Ship Experience and Marine Projects time will earn 1 credit.

Prerequisite: None

THIRD QUARTER

T-Mat 103-C—Technical Mathematics: This is a continuation of T-Mat 102-C. More advanced algebraic subjects are presented, including: special products, factoring, algebraic fractions, exponents and radicals, vector and phasor algebra, quadratic equations, graphs of quadratics, maximum and minimum, and imaginary numbers. Measurements and computations involving areas and volumes of regular figures and solids are introduced as well as trigonometric functions of oblique triangles.

Prerequisite: T-Mat 102-C

T-Phy 101—Physics: Properties of Matter: A fundamental course covering several basic principles of physics. The divisions included are solids and their characteristics, liquids at rest and in motion, gas laws and applications. Laboratory experiments and specialized problems dealing with these topics are part of this course.

Prerequisite: None

T-Msc 129—Seamanship and Power Boat Handling: The course is designed to indoctrinate the student in the various skills of deck seamanship; ship watertight design and integrity; minor routine maintenance and repair of ship and handling equipment; abandon ship and survival techniques; shipboard emergency drills and procedures, i.e., fire rescue; heavy weather; and safety measures; line handling; docking and undocking; and secure mooring and/or anchoring of a ship under light and heavy weather conditions; to teach the safe

skillful, and seamanlike operation of power boats under varying wind, weather, and sea conditions. Emphasis is placed upon nautical terminology and nomenclature. Students will launch, operate, and recover power boats.

Prerequisite: None

**T-Soc 206—American Institutions:** A study of the effect of American social, economic, political, religious, and educational institutions upon the indivdual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.

Prerequisite: None

**T-Pme 101—Marine Engines I:** A basic course introducing the student to basic construction of internal combustion engines of the reciprocating types. Hand tools and power tools, basic maintenance and repair of related equipment including starters, water pumps, and generators.

Prerequisite: None

**T-Msc 123—Ship and Marine Equipment Repair III:** This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.

Prerequisite: None

**T-Msc 111—Net Construction and Repair:** Students will be instructed in the construction of the webbing used in building fishing gear. Upon reaching proficiency of this they will be instructed in the repair of various types of fishing gear.

Prerequisite: None

**T-Chm 101—Introduction to Chemistry:** A basic introduction to elements, compounds, mixtures, symbols, formulas, equations, and weight relations in reactions and solutions. In addition, the student will be introduced to basic laboratory equipment, and techniques.

Prerequisite: None

**T-Msc 134—Marine Welding:** Welding demonstrations by the instructor and practice by students in the welding shop. Metallurgy of welding is discussed. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding and flame cutting. Emphasis on electric arc and gas welding methods applicable to mechanical repair work. Brazing also covered.

Prerequisite: None

**T-Shi 103—Ship Experience:** All students will receive sea experience aboard the school's vessels during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements of chartering scientific agencies. Students will be rotated on various assignments. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.

Prerequisite: None

And/or

**T-Shi 223—Marine Projects:** This special course will be required of all students whenever circumstances make it impossible for them to earn their complete ship experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience credit at all, and thereafter will commence one day later for each day cruised, up to ten days. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated, aboard

the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.
Thus, any combination of Ship Experience and Marine Projects time will earn 1 credit.

Prerequisite: None

FOURTH QUARTER

**T-Hed 120—First Aid:** This course will teach the students First Aid to enable them to successfully cope with the every day injuries of the marine environment. Course coverage will range from minor cuts and burns to the treatment of shock. The course will also include what to do in case of injury by dangerous and poisonous marine organisms.

Prerequisite: None

**T-Msc 112—Fishing Gear Construction:** During this quarter students will be instructed in the construction of various types of nets and traps, i.e., pound net, fyke net, lobster pots, fish and crab pots, gill nets, and various trawls and dredges.

Prerequisite: None

**T-Msc 101—Navigation I:** This course is designed to prepare the student to apply the basic marine piloting techniques using the proper equipment including various type charts and the symbols thereon, navigational aids, buoys, markers, rules of the road, light and signals. The principle and operation of the magnetic compass and its application to marine piloting, shipboard procedures, and practical marine piloting is stressed.

Prerequisite: None

**T-Bio 110—Field Biology I:** A field course in which the students will be involved in doing a biological survey of the Cape Fear River Estuary. Collection methods and data compilation will be taught.

Prerequisite: None

**T-Msc 134—Marine Welding:** Welding demonstrations by the instructor and practice by students in the welding shop. Metallurgy of welding is discussed. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding and flame cutting. Emphasis on electric arc and gas welding methods applicable to mechanical repair work. Brazing also covered.

Prerequisite: None

**T-Msc 124—Ship and Marine Equipment Repair IV:** This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.

Prerequisite: None

**T-Chm 246—Chemical Analysis of Natural Waters:** Essentially a laboratory course introducing the techniques and equipment used in the analysis of seawater. The student will carry out determinations of chlorinity, salinity, dissolved oxygen, phosphate, nitrate, and silicate.

Prerequisite: T-Chm 101

**T-Soc 206—American Institutions:** A study of the effect of American social, economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.

Prequisite: None

**T-Shi 104—Ship Experience:** All students will receive sea experience aboard the school's vessels during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements of chartering scientific agencies. Students will be rotated on various assign-

ments. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.

Prerequisite: None

And/or

T-Shi 224—Marine Projects: This special course will be required of all students whenever circumstances make it impossible for them to earn their complete Ship Experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience credit at all, and thereafter will commence one day later for each day cruised, up to ten days. Students who cruised ten days or more will not be required to take this course. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated, aboard the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.

Thus, any combination of Ship Experience and Marine Projects time will earn 1 credit.

Prerequisite: None

## FIFTH QUARTER

T-Msc 108—Classical Oceanographic Instrumentation: Basic oceanographic instrumentation is introduced with emphasis on student utilization of the equipment, equipment maintenance, and repair.

Prerequisite: None

T-Msc 212—Introduction to Data Acquisition: Introduction to the handling of oceanographic data. Temperature and salinity data will be used to demonstrate standard methods of recording and reducing oceanographic data in this sequential course.

Prerequisite: None

T-Phy 102—Physics: Work, Energy, Power: Major areas covered in this course are work, energy, and power. Instruction includes such topics as statics, forces, center of gravity and dynamics. Units of measurement and their applications are a vital part of this course. A practical approach is used in teaching students the use of essential mathematical formulas.

Prerequisites: T-Phy 101 and T-Mat 101-C

T-Msc 125—Ship and Marine Equipment Repair V: This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.

Prerequisite: None

T-Msc 113—Fishing Methods I: During this quarter the student will be instructed in the use of the various types of gear that vessels and weather conditions permit. Gear will be of the elementary type; crab pot, fish pots, gill net, and dredges as time permits.

Prerequisite: None

T-Pme 102—Marine Engines II: A continuation of T-Pme 101 covering theory of operation and breakdown and overhaul of small engines, water pumps and accessories, and maintenance on all school inboard and outboard engines.

Prerequisite: T-Pme 101

T-Edp 201—Introduction to Computer Programming: A course relating all work to specific problems in the marine technical field, such as development of data. An introduction to programming, developing, the basic systems of

numbers other than base 10, and the arranging and developing of data to form simple programming techniques.

Prerequisite: None

T-Shi 105—Ship Experience: All students will receive sea experience aboard the school's vessels during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements of chartering scientific agencies. Students will be rotated on various assignments. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.

Prerequisite: None

And/or

T-Shi 225—Marine Projects: This special course will be required of all students whenever circumstances make it impossible for them to earn their complete Ship Experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience credit at all, and thereafter will commence one day later for each day cruised, up to ten days. Students who cruised ten days or more will not be required to take this course. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated, aboard the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.
Thus, any combination of Ship Experience and Marine Projects time will earn 1 credit.

Prerequisite: None

## SIXTH QUARTER

T-Msc 102—Navigation II: A continuation of T-Msc 101 with practical shipboard piloting procedures, navigational publications, and electronic navigational aids and procedures being stressed. The use of electronic; radar, radio direction finding, loran, sonic echo ranging and recording, use of the gyro compass, etc. to extend marine piloting is introduced and studied. Classroom and practical instructions will be given in tidal and current effects, danger angles and soundings, and a continuation in the areas of navigational aids and practical seamanship.

Prerequisite: T-Msc 101

T-Elc 107-C—Electricity I: Introduction to basic theories and principles of electricity. Electrostatics, basic electric units, symbols, Ohm's Law, basic DC circuits, power, DC sources, and complex circuits are major parts of the course Practical applications are stressed.

Prerequisite: None

T-Eng 103—Report Writing: The fundamentals of English are utilized as background for the organization and techniques of modern report writing. Exercises in developing typical reports, using writing techniques and graphic devices are completed by the students. Practical application in the preparation of a full-length report is required of each student at the end of the term. This report must have to do with something in his chosen curriculum.

Prerequisite: None

T-Mat 211—Basic Statistics: The student is introduced to the terminology and mathematical notation of statistics. Topics of discussion include the description of numeric distributions (graph, mean, variance, and standard, deviation, and probability).

Prerequisite: T-Mat 103

**T-Msc 205—Data Reduction Techniques:** This course is a continuation of T-Msc 202 and will emphasize many related techniques essential to the collection, handling, and display of oceanographic survey data.
Prerequisite: T-Msc 202

**T-Msc 126—Ship and Marine Equipment Repair VI:** This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.
Prerequisite: None

**T-Geo 101—Marine Geology:** The study and identification of minerals and other physical features of the ocean floor. This course will include the identification of rocks and other mineral samples obtained from the ocean bottom. The physical characteristics of the ocean floor will be studied in depth.
Prerequisite: None

**T-Shi 106—Ship Experience:** All students will receive sea experience aboard the school's vessels during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements of chartering scientific agencies. Students will be rotated on various assignments. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.
Prerequisite: None

And/or

**T-Shi 226—Marine Projects:** This special course will be required of all students whenever circumstances make it impossible for them to earn their complete Ship Experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience credit at all, and thereafter will commence one day later for each day cruised, up to ten days. Students who cruised ten days or more will not be required to take this course. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated, aboard the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.
Thus, any combination of Ship Experience and Marine Projects time will earn 1 credit.
Prerequisite: None

## SEVENTH QUARTER

**T-Eng 204—Oral Communication:** A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement in interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

**T-Pme 103—Marine Engines III:** A course covering the operating fundamentals of several models of diesel engines and the basic principles of gas turbine engines. General Motors, Cooper Bessimer and Ford Diesel engines will be utilized as teaching aids.
Prerequisite: T-Pme 102

**T-Elc 108-C—Electricity II:** Introduction to alternating current theory, simple generators, sine wave analysis, induction. capacitance reactance impedence, phase relations, etc. A continuation of T-Elc 107 stressing practical applications and industry practices.
Prerequisite: T-Elc 107

T-Msc 127—Ship and Marine Equipment Repair VII: This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.
Prerequisite: None

T-Dft 117—Drafting and Blueprint Reading: The field of drafting is introduced. The student learns of the elementary practices and principles employed by draftsmen. This knowledge is put to use reading actual blueprints. Fresh and orthographic and pictorial sketching and standards and practices of dimensioning are included for communications from technician to machinist or other artisan.
Prerequisite: None

T-Bio 210—Field Biology II: A continuation of field biological survey techniques begun in T-Bio 110.
Prerequisite: None

T-Shi 107—Ship Experience: All students will receive sea experience aboard the school's vessels during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements of chartering scientific agencies. Students will be rotated on various assignments. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.
Prerequisite: None

And/or

T-Shi 227—Marine Projects: This special course will be required of all students whenever circumstances make it impossible for them to earn their complete Ship Experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience credit at all, and thereafter will commence one day later for each day cruised, up to ten days. Students who cruised ten days or more will not be required to take this course. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated, aboard the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.

Thus, any combination of Ship Experience and Marine Projects time will earn 1 credit.
Prerequisite: None

EIGHTH QUARTER

T-Msc 114—Fishing Methods II: The students will be instructed in the use of the various types of gear that vessels and weather conditions permit. Gear will be of the more sophisticated type; pond nets, fyke nets, lobster pots, various trawls, and larger specialized dredges.
Prerequisite: T-Msc 113

T-Msc 204—Ocean Survey Equipment: Practical oceanographic shop and small craft training combining the use of hand tools with the design, construction, testing, maintenance, and repair of specialized equipment used in general oceanography and limnology.
Prerequisite: None

T-Elc 109-C—Electricity III: Continues T-Elc 108 circuit analysis. Study of the basic principles and use of common instruments and electrical measuring devices. Some basic electronics is inevitable when investigating such a subject. Practical applications and electrical code requirements are stressed.
Prerequisite: T-Elc 108

**T-Pme 104—Marine Engines IV:** This course is designed to teach trouble shooting, repair and overhaul of outboard, inboard outboards and small gasoline inboard engines of the reciprocating internal combustion types. The following subjects will be taught: ignition, carboration, remote control hookups, alignment, twin and lower units.

Prerequisite: None

**T-Msc 224—Chemical Oceanographic Sampling:** Combines emphasis upon the fundamentals of lab procedure and the operation, maintenance, and calibration of chemical instrumentation used in typical oceanographic and limnological surveys.

Prerequisite: None

**T-Pho 110—Introduction to Photography:** A basic course in the photographing of objects, and in developing film and prints. Students will study the taking of pictures with the use of natural lighting.

Prerequisite: None

**T-Msc 128—Ship and Marine Equipment Repair VIII:** This course will be offered to provide practical experience in trade and technical marine fields specifically related to the needs of graduates based on continuing surveys of marine industry.

Prerequisite: None

**T-Ship 108—Ship Experience:** All students will receive sea experience aboard the school's vessels during each quarter, the extent and dates to be determined by weather conditions, vessel operational status, and contractual arrangements. They should expect to apply theories and practices studied while ashore. Two units of credit will be given for each 60 hours of ship experience or instruction during cruises.

Prerequisite: None

And/or

**T-Shi 228—Marine Projects:** This special course will be required of all students whenever circumstances make it impossible for them to earn their complete Ship Experience credit during any quarter. It will commence the tenth week of class for students who earned no Ship Experience credit at all, and thereafter will commence one day later for each day cruised, up to ten days. Students who cruised ten days or more will not be required to take this course. Students will be assigned to one and hopefully more instructors and/or ship personnel in this course, who will be required to develop and supervise projects in their respective marine related areas for the days and times indicated aboard the docked ship or ashore. 40 hours of participation in this course will equal one credit, or 8 hours per day will equal 0.2 credits.

Thus, any combination of Ship Experience and Marine Projects time will earn 1 credit.

Prerequisite: None

## SECRETARIAL — ENGINEERING AND TECHNICAL

The Engineering and Technical Secretary Curriculum is designed to prepare a student for a position in the office of a firm dealing in research, development and production in the scientific fields. The curriculum offers students the necessary secretarial skills and the required background of understanding and appreciation of the scientific method, the beginnings of a technical vocabulary and a feeling of respect for accuracy that will be essential in later work in the field.

Graduates of this program may qualify for employment as stenographer-secretaries, technical secretaries, and possibly as private secretaries. They are in demand where engineers and other technical personnel find a need for secretarial help who can understand the specialized language of Electrical, Mechanical, Civil, or Chemical Engineers. The duties of an engineering and technical secretary may consist of taking dictation and reports, meeting office callers and screening telephone calls, filing, and scheduling appointments. Graduates of this program, since they have received a background of science and engineering terminology in addition to their business background, are admirably prepared to work with engineering reports, records and correspondence.

## SECRETARIAL — ENGINEERING AND TECHNICAL

| | | Hours Per Week | | | |
|---|---|---|---|---|---|
| | | Class | Lab | Manipulative Lab | Quarter Hours Credit |
| **FIRST QUARTER** | | | | | |
| T-ENG | 101-C—Grammar and Composition | 3 | 2 | 0 | 4 |
| T-BUS | 102—Typewriting (or Elective) | 2 | 0 | 3 | 3 |
| T-MAT | 110—Business Mathematics | 5 | 0 | 0 | 5 |
| T-BUS | 106—Shorthand (Elective) | 3 | 2 | 0 | 4 |
| T-ECO | 102—Economics | 3 | 0 | 0 | 3 |
| | | 16 | 4 | 3 | 19 |
| **SECOND QUARTER** | | | | | |
| T-ENG | 102-C—Grammar and Composition | 3 | 2 | 0 | 4 |
| T-BUS | 103—Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 107—Shorthand | 3 | 2 | 0 | 4 |
| T-BUS | 115-C—Business Law | 5 | 0 | 0 | 5 |
| T-BUS | 120—Accounting | 5 | 2 | 0 | 6 |
| | | 18 | 6 | 3 | 22 |
| **THIRD QUARTER** | | | | | |
| T-ENG | 206—Business Communication | 3 | 0 | 0 | 3 |
| T-BUS | 104—Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 108—Shorthand | 3 | 2 | 0 | 4 |
| T-BUS | 121—Accounting | 5 | 2 | 0 | 6 |
| T-BUS | 183—Terminology and Vocabulary (Technical) | 3 | 0 | 0 | 3 |
| | | 16 | 4 | 3 | 19 |
| **FOURTH QUARTER** | | | | | |
| T-BUS | 205—Advanced Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 206—Dictation and Transcription | 3 | 2 | 0 | 4 |
| T-BUS | 110-C—Office Machines | 1 | 2 | 0 | 2 |
| T-EDP | 104—Introduction to Data Processing Systems | 3 | 2 | 0 | 4 |
| T-PSY | 206-C—Applied Psychology | 3 | 0 | 0 | 3 |
| | | 12 | 6 | 3 | 16 |
| **FIFTH QUARTER** | | | | | |
| T-ENG | 204—Oral Communication | 3 | 0 | 0 | 3 |
| T-BUS | 207-C—Dictation and Transcription | 3 | 2 | 0 | 4 |
| T-DFT | 104—Blueprint Reading: Mechanical | 3 | 0 | 0 | 3 |
| T-SOC | 102-C—Principles of Sociology | 3 | 0 | 0 | 3 |
| T-BUS | 209—Advanced Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 213—Office Procedures | 3 | 2 | 0 | 4 |
| | | 17 | 4 | 3 | 20 |
| **SIXTH QUARTER** | | | | | |
| T-BUS | 112-C—Filing | 3 | 2 | 0 | 4 |
| T-BUS | 208—Dictation and Transcription | 3 | 2 | 0 | 4 |
| T-BUS | 210—Advanced Typewriting | 2 | 0 | 3 | 3 |
| T-BUS | 271-C—Office Management and Supervision | 3 | 2 | 0 | 4 |
| T-SOC | 206—American Institutions | 3 | 0 | 0 | 3 |
| | | 14 | 6 | 3 | 18 |

# SECRETARIAL — ENGINEERING AND TECHNICAL

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

T-Eng 101-C—Grammar and Composition: Designed to aid the student in the improvement of self-expression in both writing and speaking. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English, grammar and written composition in their day to day situations.
Prerequisite: None

T-Bus 102—Typewriting: Introduction to the touch typewriting system with emphasis on correct techniques, mastery of the keyboard, simple business correspondence, tabulation, and manuscripts. Minimum speed requirement—15 gross words a minute with 5 errors allowed.
Prerequisite: None

T-Mat 110—Business Mathematics: This course stresses the fundamental operations and their application to business problems. Topics covered include payrolls, price marking, interest and discount, commission, taxes, and pertinent uses of mathematics in the field of business.
Prerequisite: None

T-Bus 106—Shorthand: A beginning course in the theory and practice of reading and writing shorthand. Emphasis on phonetics, penmanship, word families, brief forms, and phrases.
Prerequisite: None

T-Eco 102—Economics: The fundamental principles of ecomomics including the institutions and practices by which people gain a livelihood. Included is a study of the laws of supply and demand and the principles bearing upon production, exchange, distribution, and consumption both in relation to the individual enterprise and to society at large.
Prerequisite: None

### SECOND QUARTER

T-Eng 102-C—Grammar and Composition: In this continuation of T-Eng 101-C, emphasis is placed on advanced grammar and diction and the application of these in compositional work culminating in a term paper.
Prerequisite: T-Eng 101-C

T-Bus 103—Typewriting: Instruction emphasizes the development of speed and accuracy with further mastery of correct typewriting techniques. These skills and techniques are applied in tabulation, manuscript, correspondence, and business forms. Minimum speed requirement—25 gross words a minute with 5 errors allowed.
Prerequisite: T-Bus 102 or equivalent

T-Bus 107—Shorthand: Continued study of theory with greater emphasis on dictation and elementary transcription.
Prerequisite: T-Bus 106 or the equivalent

T-Bus 115-C—Business Law: A general course designed to acquaint the student with certain fundamentals and principles of business law, including contracts, negotiable instruments, and agencies.
Prerequisite: None

T-Bus 120—Accounting: Principles, techniques and tools of accounting, for understanding of the mechanics of accounting. Collecting, summarizing, analyzing, and reporting information about service and mercantile enterprises. to include practical application of the principles learned.
Prerequisite: T-Mat 110

## THIRD QUARTER

**T-Eng 206—Business Communication:** Develops skills in techniques of writing business communications. Emphasis is placed on writing action in such situations as sales, applications, orders, letters involving credit, collections, adjustments, and inquiry.

Prerequisite: T-Eng 102-C

**T-Bus 104—Typewriting:** Emphasis on production typing problems and speed building. Attention to the development of the student's ability to function as an expert typist, producing mailable copies. The production units are tabulation, manuscript, correspondence and business forms. Minimum speed requirement —35 gross words a minute with 4 errors allowed.

Prerequisite: T-Bus 103 or equivalent

**T-Bus 108—Shorthand:** Theory and speed building. Introduction to office-style dictation. Emphasis on development of speed in dictation and accuracy in transcription.

Prerequisite: T-Bus 107

**T-Bus 121—Accounting:** Partnership and corporation accounting including a study of payrolls, federal and state taxes. Emphasis is placed on the recording, summarizing and interpreting data for management control rather than on bookkeeping skills. Accounting services are shown as they contribute to the recognition and solution of management problems.

Prerequisite: T-Bus 120

**T-Bus 183—Terminology and Vocabulary:** To develop an understanding of the terminology and vocabulary appropriate to the course of study, as it is used in business, technical, and professional offices.

Prerequisite: T-Bus 107

## FOURTH QUARTER

**T-Bus 205—Advanced Typewriting:** Emphasis is placed on the development of individual production rates. The student learns the techniques needed in planning and in typing projects that closely approximate the work appropriate to the field of study. These projects include review of letter forms, methods of duplication, statistical tabulation, and the typing of reports, manuscripts and legal documents. Minimum speed requirement—40 gross words a minute with 3 errors allowed.

Prerequisite: T-Bus 104

**T-Bus 206—Dictation and Transcription:** Develops the skill of taking dictation and of transcribing at the typewriter materials appropriate to the course of study, which includes a review of the theory and the dictation of familiar and unfamiliar material at varying rates of speed. Minimum dictation rate of 80 words per minute for three minutes on new material.

Prerequisite: T-Bus 108

**T-Bus 110-C—Office Machines:** A general survey of the business and office machines. Students will receive training in techniques, processes, operation and application of the ten-key adding machines, full keyboard adding machines, and calculator.

Prerequisite: None

**T-Edp 104—Introduction to Data Processing Systems:** Fundamental concepts and operational principles of data processing systems, as an aid in developing a basic knowledge of computers, a prerequisite to the detail study of particular computer problems.

Prerequisite: None

T-Psy 206-C—Applied Psychology: A study of the principles of psychology that will be of assistance in the understanding of inter-personal relations on the job. Motivation, feelings and emotions are considered with particular reference to on-the-job problems. Other topics investigated are: employee selection, supervision, job satisfaction, and industrial conflicts. Attention is also given to personal and group dynamics so that the student may learn to apply the principles of mental hygiene to his adjustment problems as a worker and a member of the general community.
Prerequisite: None

FIFTH QUARTER

T-Eng 204—Oral Communication: A study of basic concepts and principles of oral communications to enable the student to communicate. This course places emphasis on improving diction, pronunciation, voice, and speaking habits to produce effective oral presentation. Content includes student involvement in interviews, in videotaping, and in various types of speeches such as the impromptu speech and the speech to persuade.
Prerequisite: None

T-Bus 207-C—Dictation and Transcription: Covering materials appropriate to the course of study, the student develops the accuracy, speed, and vocabulary that will enable her to meet the stenographic requirements of business and professional offices. Minimum dictation rate of 90 words per minute required for three minutes on new material.
Prerequisite: T-Bus 206

T-Dft 104—Blueprint Reading: Mechanical: Interpretation and reading of blueprints. Development of ability to read and interpret blueprints, charts, instruction and service manuals, and wiring diagrams. Information on the basic principles of lines, views, dimensioning procedures, and notes.
Prerequisite: None

T-Soc 102-C—Principles of Sociology: An introductory course in the principles of sociology. An attempt to provide an understanding of culture, collective behavior, community life, social institutions and social change. Presents the scientific study of man's behavior in relation to other men, the general laws affecting the organization of such relationships and the effects of social life on human personality and behavior.
Prerequisite: None

T-Bus 209—Advanced Typewriting: Emphasis is placed on speed building and on typing projects related to actual office situations. These include additional duplication, tabulation, and the typing of rough-draft and straight-copy documents, reports, and forms used in legal, technical and business offices. Minimum speed requirement—45 gross words a minute with 3 errors allowed.
Prerequisite: T-Bus 205

T-Bus 213—Office Procedures: Designed to acquaint the student with the responsibilities encountered by a general office worker during the work day. These include the following: receptionist duties, handling the mail, telephone techniques, travel information, telegrams, office records, purchasing of supplies, office organization, and insurance claims.
Prerequisite: None

SIXTH QUARTER

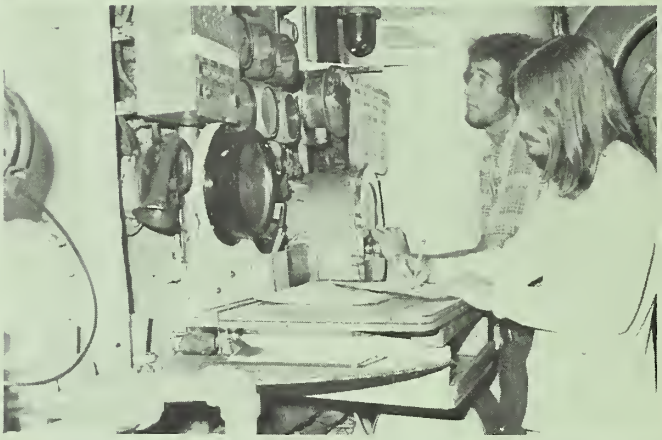
T-Bus 112-C—Filing: Fundamentals of indexing and filing, combining theory and practice by the use of miniature letters, filing boxes and guides. Alphabetic, Triple Check, Automatic, Geographic, Subject, Soundex, and Dewey Decimal filing.
Prerequisite: None

**T-Bus 208—Dictation and Transcription:** Principally a speed building course, covering materials appropriate to the course of study, with emphasis on speed as well as accuracy. Minimum dictation rate of 100 words per minute required for 3 minutes on new material.
**Prerequisite:** T-Bus 207

**T-Bus 210—Advanced Typewriting:** A course designed to fill the need of the student in his final quarter of typewriting. Additional emphasis placed on accuracy and speed. Minimum speed requirement—50 gross words a minute with 3 errors allowed.
**Prerequisite:** T-Bus 209

**T-Bus 271-C—Office Management and Supervision:** Presents the fundamental principles of office management, including office automation, planning, controlling, and organizing. Emphasis is placed on securing an effective work force and the role of the supervisor.
**Prerequisite:** None

**T-Soc 206—American Institutions:** A study of the effect of American social, economic, political, religious, and educational institutions upon the individual in his role as a citizen and a worker. The course dwells upon current local, national, and global problems in the light of our political and economic heritage.
**Prerequisite:** None



## TECHNICAL ELECTIVES

**T-Edp 201—Introduction to Computer Programming:** This course introduces the student to the operation of a computer terminal connected to a computer and the process of developing simple programs for problem solving for this computer. Topics covered include: Algorithms, Flowcharting, Commands, Statements, Built-in Functions, Arrays, and Strings. Applications in this course will depend on the curriculum in which the student is enrolled.

Course Hours Per Week: Class, 1; Lab, 4; Shop, 0, Quarter Hours Credit 3

Prerequisite: None

**T-Edp 211—Advanced Interactive Programming:** This is a continuation of T-Edp 201, designed to familiarize the student with advanced concepts of a computer language as an aid in problem solving. The student will be introduced to more sophisticated programming techniques emphasizing program efficiency. Topics covered include: Logical Operations, Matrices, Strings, Formatted Outputs, Files, and Magnetic Tape Cassette Operations.

Course Hours Per Week: Class, O; Lab, 4; Shop, 0, Quarter Hours Credit 2

Prerequisite: T-Edp 201

**T-Mat 208—Precalculus Mathematics:** This course is designed to provide a basic foundation for a beginning course in calculus. Material covered will provide a rigorous examination of algebraic and trigonometric relationships with extensive work in analytic geometry.

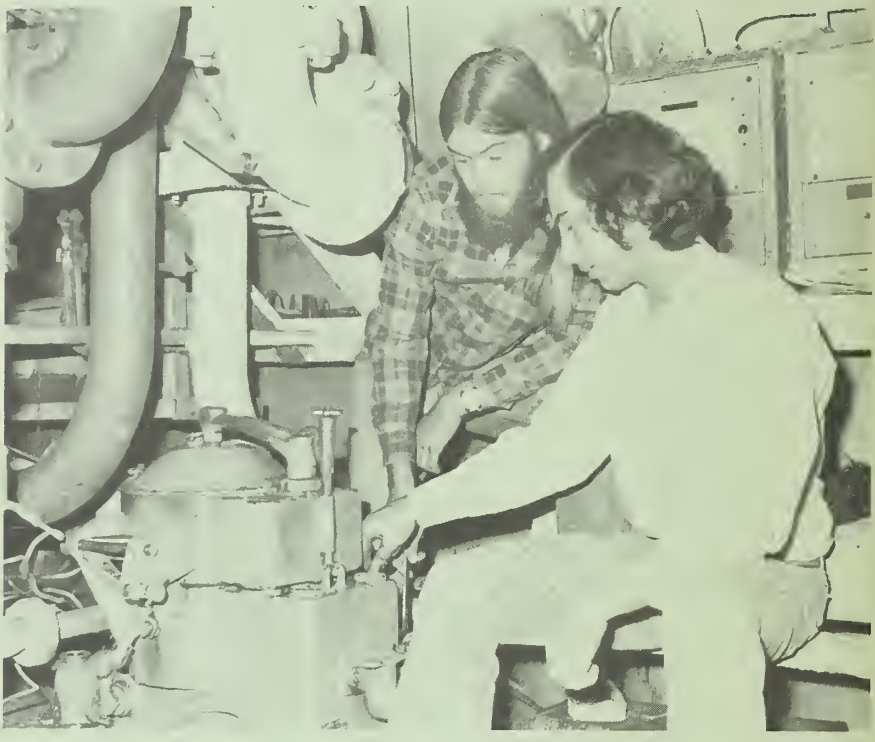
Course Hours Per Week: Class, 5; Lab, 0; Shop, 0, Quarter Hours Credit 5

Prerequisites: T-Mat 101, T-Mat 102, and T-Mat 103, or equivalents

**T-Mat 209—Introduction to Calculus:** T-Mat 209 is a beginning course in calculus. Topics include the concept and application of the limit, series, the derivative, and the integral. Emphasis is placed on the practical aspects of the differentiation and integration of simple algebraic and trancendental functions.

Course Hours Per Week: Class, 5; Lab, 0; Shop, 0, Quarter Hours Credit 5

Prerequisite: T-Mat 208 or equivalent



# TRADE CURRICULA

## TRADE CURRICULA

In North Carolina as well as throughout the nation, the demand for skilled tradesmen is at an all-time high. Hardly a day passes that the Institute does not have at least one call from industry looking for prospective employees. Graduates of the trade programs sometimes have as many as four or five offers of employment upon graduation.

Students in the skilled trade programs are trained in shops similar to those of private industries. The shops contain testing and measuring instruments, tools, and equipment of the same size and types as found in private firms. The facilities make possible practical instruction which is essential to the preparation of skilled workers needed by today's modern industries. Students in these trade programs spend twenty-five to thirty hours per week in school; this time is divided between classroom studies and practice shop-work.

Skilled craftsmanship in the occupation, appropriate educational background and leadership ability are the basis for instructor selection in these trade courses.

A diploma is awarded to those students who satisfactorily complete the full time trade program. To be eligible for the diploma, a satisfactory passing grade must be maintained in all shop work and related class subjects.

## COURSES OFFERED

One year (12 months) training courses are offered in the following skilled trades:

Automotive Body Repair
Automotive Mechanics
Commercial Fishing
Drafting, Mechanical
Heating & Air-Conditioning
Heavy Equipment Mechanics
Industrial Air Conditioning (Specialty)
Industrial Machine Operator (Specialty)
Industrial Electricity
Machine Trades
Marine Diesel Mechanics
Operating Room Assistant (6 months)—Offered periodically
Practical Nurse Education
Radio & Television Servicing (Electronic Servicing)
Welding

## ADMISSION REQUIREMENTS

1. Must be at least 18 years of age, or his high school class must have graduated.

2. Should be a high school graduate but must have completed at least eight (8) units of high school work — exceptions may be made for more mature adults who have been out of school for some time. Must be a high school graduate or the equivalent* to enter practical nursing program.

3. Must demonstrate aptitude for trade-vocational training as determined by standard tests. These tests will aid in student selection, placement, and guidance. Guidance and counseling will be available to the student throughout his education.

4. Must have sufficient mathematics to make success in the course of study likely.

5. Must complete medical form provided by the Institute.

6. A personal interview is required.

## ADMISSION PROCEDURE

1. Submit completed application.

2. Have transcripts of all previous education mailed to the Institute.

3. Must take placement test.

4. Submit medical form to the Institute.

5. Come to the school for personal interview and additional testing when asked to do so.

*See page 186 in the General Adult Education Section of this catalogue for details about the high school equivalency certificate.

## AUTOMOTIVE BODY REPAIR

The curriculum at Cape Fear Technical Institute in Automotive Body Repair devotes much of its time in the shop to learning of necessary skills and practicing of these skills on body components. Every attempt is made to make these practical experiences as similar to on-the-job practices as possible. A graduate from this curriculum will receive a certificate.

# AUTOMOTIVE BODY REPAIR

## SUGGESTED SEQUENCE OF REQUIRED COURSES FOR AUTOMOTIVE BODY REPAIR

| COURSE TITLE | | Hours Per Week | | | Quarter Hours Credit |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | |
| AUT | 1111—Auto Body Repair I | 4 | 0 | 12 | 8 |
| WLD | 1101—Basic Gas Welding | 0 | 0 | 6 | 2 |
| AUT | 1115—Trim, Glass and Radiator Repair | 2 | 0 | 6 | 4 |
| | | 6 | 0 | 24 | 14 |
| **SECOND QUARTER** | | | | | |
| AUT | 1112—Auto Body Repair II | 3 | 0 | 12 | 7 |
| WLD | 1105—Auto Body Welding | 3 | 0 | 6 | 2 |
| AUT | 1113—Metal Finishing and Painting | 3 | 0 | 6 | 5 |
| | | 6 | 0 | 24 | 14 |
| **THIRD QUARTER** | | | | | |
| AUT | 1114—Auto Body Applications | 3 | 0 | 15 | 8 |
| AUT | 1123—Automotive Chassis and Suspension Systems | 3 | 0 | 9 | 6 |
| | | 6 | 0 | 24 | 14 |

## COURSE DESCRIPTIONS

### FIRST QUARTER

**Aut 1111—Auto Body Repair I:** Basic principles of automobile construction, design and manufacturing are covered in the beginning of the course. A thorough study is made of angles, crown and forming of steel into the contour of the present-day vehicles. The practical application is to have the student apply the first principles of straightening, aligning and painting of damaged areas.

Prerequisite: None

**Wld 1101—Basic Gas Welding:** Welding demonstrations by the instructor and practice by students in the oxy-acetylene welding shop. Safe and correct methods of assembling and operating the welding equipment are emphasized. Practice is given in surface welding, bronze welding, silver-soldering and flame cutting methods applicable to mechanical repair work.

Prerequisite: None

**Aut 1115—Trim, Glass and Radiator Repair:** Principles of removal and installation of all phases of interior trim are applied. Cutting, sewing and installing headlinings, seat covers and door trim panels are covered in class and in their practical application. Glass removal, cutting, fitting and installation are covered in detail. A thorough knowledge of the engine cooling system, a study of repairs made necessary by accident to the system and testing to insure normal engine cooling operation are emphasized. Advanced painting of trim parts and accessories requiring extreme care and skill is included in the course.

Prerequisite: None

## SECOND QUARTER

Aut 1112—Auto Body Repair II: A thorough study of the requirements of a metal worker, the use of essential tools, forming fender flanges and beads, and straightening typical damage. It is here that the student begins acquiring skills, learning dexterity in shaping angles, crowns and contour of the metal of the body and fenders. More difficult types of metal working and painting are assigned.

Prerequisite: Aut 1111

Wld 1105—Auto Body Welding: Welding practices on material applicable to the installation of body panels and repairs to doors, fenders and deck lids. The student runs beads, does butt and fillet welds and performs all tests to detect strength and weaknesses of welded joints. Safety procedures are emphasized throughout the course.

Prerequisite: None

Aut 1113—Metal Finishing and Painting: The development of the skills of shrinking stretched metal, soldering and leading and preparing metal for the painter. Straightening of doors, hoods and deck lids and fitting and aligning are emphasized. Refinishing includes painting of fender or panel, spot repairs, and complete vehicle painting. The use and application of required power tools complete this phase.

Prerequisite: None

## THIRD QUARTER

Aut 1114—Body Shop Applications: Application of all phases of training. Methods of removing and installing interior trim; painting of trim parts and accessories. Glass removal and installation. Repairing and replacing damaged cooling system components. Repair order writing, parts purchasing, estimates of damage, and developing the final settlement with the adjuster.

Prerequisite: None

Aut 1123—Automotive Chassis and Suspension Systems: Principles and functions of the components of automotive chassis. Practical job instruction in adjusting and repairing of suspension and steering systems. Units to be studied: shock absorbers, springs, steering systems, steering linkage, and front end alignment.

Prerequisite: None

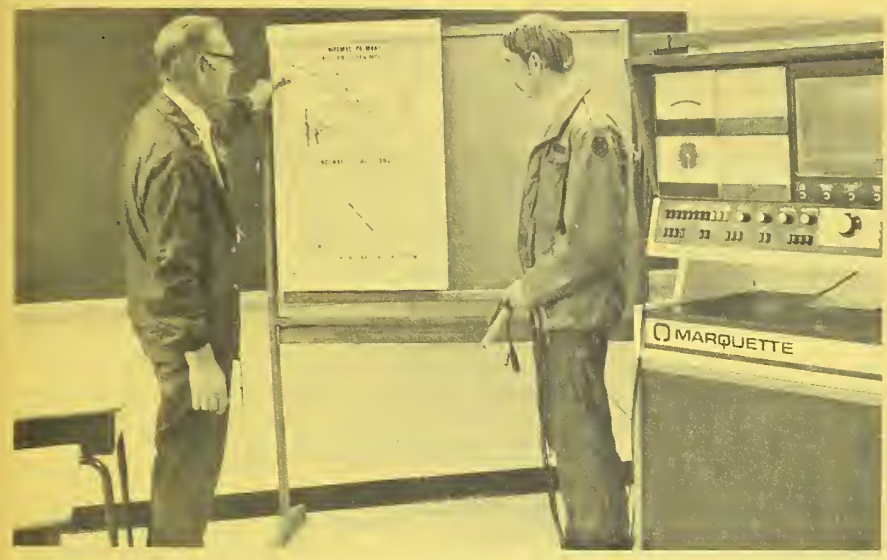
## AUTOMOTIVE MECHANICS

This curriculum provides a training program for developing the basic knowledge and skills needed to inspect, diagnose, repair or adjust automotive vehicles. Manual skills are developed in practical shop-work. Thorough understanding of the operating principles involved in the modern automobile comes in class assignments, discussion, and shop practice.

Complexity in automotive vehicles increases each year because of scientific discovery and new engineering. These changes are reflected not only in passenger vehicles, but also in trucks, buses and a variety of gasoline-powered equipment. This curriculum provides a basis for the student to compare and adapt to new techniques for servicing and repair as vehicles are changed year by year.

Automobile mechanics maintain and repair mechanical, electrical, and body parts of passenger cars, trucks, and buses. In some communities and rural areas they also may service tractors or marine engines and other gasoline-powered equipment. Mechanics inspect and test to determine the cause of faulty operation. They repair or replace defective parts to restore the vehicle or machine to proper operating condition. They use shop manuals and other technical publications.

Automotive mechanics in smaller shops usually are general mechanics qualified to perform a variety of repair jobs. A large number of automobile mechanics specialize in particular types of repair work. For example, some may specialize in repairing only power steering and power brakes, or automatic transmissions. Usually such specialists have an all-round knowledge of automotive repair and may occasionally be called upon to do other types of work.




## AUTOMOTIVE MECHANICS

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| PME | 1101—Internal Combustion Engines | 3 | 0 | 15 | 8 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| ENG | 1101-C—Communication Skills | 2 | 0 | 0 | 2 |
| PHY | 1101—Applied Science | 3 | 2 | 0 | 3 |
| | | 13 | 2 | 15 | 18 |
| **SECOND QUARTER** | | | | | |
| PME | 1102—Engine Electrical and Fuel Systems | 5 | 0 | 15 | 10 |
| ENG | 1102-C—Communication Skills | 2 | 0 | 0 | 2 |
| AUT | 1126—Schematics & Diagrams: Automotive | 0 | 0 | 3 | 1 |
| PHY | 1102—Applied Science | 3 | 2 | 0 | 3 |
| | | 10 | 2 | 18 | 16 |
| **THIRD QUARTER** | | | | | |
| AUT | 1120—Automotive Analysis | 2 | 0 | 3 | 3 |
| AUT | 1123—Auto. Chassis & Suspension Systems | 3 | 0 | 9 | 6 |
| AUT | 1121—Braking Systems | 3 | 0 | 3 | 4 |
| PSY | 1101—Human Relations | 3 | 0 | 0 | 3 |
| AHR | 1101-C—Automotive Air Conditioning | 1 | 0 | 3 | 2 |
| | | 12 | 0 | 18 | 18 |
| **FOURTH QUARTER** | | | | | |
| AUT | 1124—Automotive Power-Train Systems | 3 | 0 | 9 | 6 |
| AUT | 1125—Automotive Servicing | 3 | 0 | 9 | 6 |
| BUS | 1103—Small Business Operations | 3 | 0 | 0 | 3 |
| WLD | 1101-C—Basic Welding | 0 | 0 | 3 | 1 |
| | | 9 | 0 | 21 | 16 |

# AUTOMOTIVE MECHANICS

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

Pme 1101—Internal Combustion Engines: Development of a thorough knowledge and ability in using, maintaining, and storing the various hand tools and measuring devices needed in engine repair work. Study of the construction and operation of components of internal combustion engines. Testing of engine performance servicing and maintenance of pistons, valves, cams and camshafts, fuel and exhaust systems, cooling systems; proper lubrication, and methods of testing, diagnosing and repairing.
Prerequisite: None

Mat 1101—Applied Mathematics: Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

Eng 1101-C—Communication Skills: The first of two courses designed to improve the student's abilities in all areas of communications. Emphasis during the first quarter will be placed on the development of improved reading habits and basic composition skills.
Prerequisite: None

Phy 1101—Applied Science: An introduction to physical principles and their application in industry. Topics in this course include measurement; properties of solids, liquids, and gases; basic electrical principles.
Prerequisite: None

### SECOND QUARTER

Pme 1102—Engine Electrical and Fuel Systems: A thorough study of the electrical and fuel systems of the automobile. Battery cranking mechanism, generator, ignition, accessories and wiring; fuel pumps, carburetors, and fuel injectors. Characteristics of fuels, types of fuel systems, special tools, and testing equipment for the fuel and electrical system.
Prerequisite: Pme 1101

Eng 1102-C—Communication Skills: A continuation of Eng 1101-C. In addition to reading and writing, the principles of effective speech will be practiced. Writing practice will include the filling out of job applications, composing personal history, statements, writing request for references, and then procedures related to job acquisition.
Prerequisite: Eng 1101-C

Aut 1126—Schematics & Diagrams: Automotive: Interpretation and reading of manufacturing diagrams. Development of ability to read and interpret blueprints, charts, instruction and service manuals, and wiring diagrams. Information on the basic principles of lines, views, dimensioning procedures, and notes.
Prerequisite: None

Phy 1102—Applied Science: The second in a series of two courses of applied physical principles. Topics introduced in this course are heat and thermometry, and principles of force, motion, work, energy, and power.
Prerequisite: Phy 1101

## THIRD QUARTER

**Aut 1120—Automotive Analysis:** An analytical approach to trouble shooting and preventive maintenance through the use of mechanical equipment, electronic instrumentation, and visual inspection. Students will train on various electronic analysis equipment, chassis dynamometer, combustion analyzer, etc., for proper trouble shooting diagnosis. Students will be instructed in procedures to be followed in trouble shooting analysis of an internal combustion engine, brakes, steering and suspension, electrical circuits and drive lines.
Prerequisite: None

**Aut 1123—Automotive Chassis and Suspension Systems:** Principles and functions of the components of automotive chassis. Practical job instruction in adjusting and repairing of suspension, and steering systems. Units to be studied will be shock absorbers, springs, steering systems, steering linkage, front alignment, and safety factors involved.
Prerequisite: Pme 1102

**Aut 1121—Braking Systems:** A complete study of various braking systems employed on automobiles and lightweight trucks. Emphasis is placed on how they operate, proper adjustment and repair and safety factors involved.
Prerequisite: Phy 1102

**Psy 1101—Human Relations:** A study of basic principles of human behavior. The problems of the individual are studied in relation to society, group membership, and relationships within the work situation.
Prerequisite: None

**Ahr 1101-C—Automotive Air Conditioning:** General introduction to the Principles of Refrigeration; study of assembly of the components and connections necessary in the mechanisms; the methods of refrigerants in charging the system.
Prerequisite: None

## FOURTH QUARTER

**Aut 1124—Automotive Power-Train Systems:** Principles and functions of automotive power train systems: clutches, transmission gears, torque converters, drive shaft assemblies, rear axles and differentials. Identification of troubles, servicing, and repair.
Prerequisite: Aut 1123

**Aut 1125—Automotive Servicing:** Emphasis is on the shop procedures necessary in determining the nature of troubles developing in the various component systems of the automobile. Troubleshooting of automotive systems, providing a full range of experiences in testing, adjusting, repairing and replacing.
Prerequisites: Aut 1123, Aut 1121

**Bus 1103—Small Business Operations:** An introduction to the business world, problems of small business operation, basic business law, business forms and records, financial problems, ordering and inventorying, layout of equipment and offices, methods of improving business, and employer-employee relations.
Prerequisite: None

**Wld 1101-C—Basic Welding:** Welding demonstrations by the instructor and practice by students in the welding shop. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding; bronze welding, silver-soldering, and flame-cutting methods applicable to mechanical repair work.
Prerequisite: None

## COMMERCIAL FISHING

The Commercial Fishing Industry is composed of approximately 160,000 men using various combinations from primitive hand methods to sophisticated modern methods of harvesting large quantities of fish.

Many opportunities exist for individuals who have the technology and skills required in working aboard commercial fishing boats. This curriculum puts great stress on the development of commercial fishermen through practical hands-on application in all phases of this highly skilled trade. Included in this program is emphasis on maintenance and repair of all equipment used aboard the fishing vessel. The various seamanship skills expected of a man pursuing this vocation are also thoroughly covered and put into actual practice at sea.

The objective of this curriculum is to develop within each individual the ability to function effectively at any task assigned to him as a member of a commercial fishing crew.

## COMMERCIAL FISHING

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| FIRST QUARTER | | Class | Lab | Shop | Credit |
| MAT | 1101—Applied Math | 5 | 0 | 0 | 5 |
| MRO | 1101—Rules of the Road & Piloting | 3 | 2 | 0 | 4 |
| WLD | 1106—Welding & Burning I | 0 | 0 | 6 | 2 |
| MRO | 1106—Practical Marine Engineering I | 2 | 0 | 3 | 3 |
| MRO | 1139—Rigging & Seamanship | 2 | 0 | 3 | 3 |
| MRO | 1140—Marine Safety—First Aid and Lifeboat Drills, and Fire-fighting Aboard Ship | 1 | 0 | 3 | 2 |
| | | 13 | 2 | 15 | 19 |
| SECOND QUARTER | | | | | |
| MRO | 1102—Electronic Aids to Navigation | 1 | 2 | 0 | 2 |
| ENG | 1101-C—Communication Skills | 3 | 0 | 0 | 3 |
| MRO | 1107—Practical Marine Engineering II | 0 | 0 | 6 | 2 |
| CFT | 1101—Fishing Operations I | 0 | 0 | 6 | 2 |
| WLD | 1107—Welding & Burning II | 0 | 0 | 6 | 2 |
| ELC | 1106—Practical Marine Electricity I | 0 | 6 | 0 | 3 |
| | | 4 | 8 | 18 | 14 |
| THIRD QUARTER | | | | | |
| PSY | 1104—Job Adjustment Skills | 2 | 0 | 0 | 2 |
| BUS | 1103—Small Business Operations | 3 | 0 | 0 | 3 |
| CFT | 1102—Fishing Operations II | 0 | 0 | 6 | 2 |
| MRO | 1108—Practical Marine Engineering III | 0 | 0 | 6 | 2 |
| DFT | 1111—Machine Trades Blueprint Reading & Sketching | 1 | 0 | 3 | 2 |
| ELC | 1107—Practical Marine Electricity II | 0 | 6 | 0 | 3 |
| | | 6 | 6 | 15 | 14 |

| FOURTH QUARTER | | Hours Per Week Class | Lab | Shop | Quarter Hours Credit |
|---|---|---|---|---|---|
| MSC | 2001—Marine Fishery Science & Seafood Handling | 2 | 2 | 0 | 3 |
| MSC | 1030—Advanced Navigation | 1 | 0 | 3 | 2 |
| CFT | 1103—Fishing Operations III | 0 | 0 | 12 | 4 |
| MRO | 1109—Practical Marine Engineering IV | 0 | 0 | 6 | 2 |
| BIO | 1101—Marine Biology, Introduction | 4 | 0 | 0 | 4 |
| | | 7 | 2 | 21 | 15 |

## COMMERCIAL FISHING

### COURSE DESCRIPTION BY QUARTERS

### FIRST QUARTER

**Mat 1101—Applied Mathematics:** Practical number theory. Analysis of basic operations: addition, subtraction, multiplication, and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometry figures used in industry; measurements of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

**Mro 1101—Rules of the Road and Piloting:** This course is intended to familiarize the student with basic piloting techniques in the inland waterways, rivers, and sounds in particular. Special emphasis is on the Inland Rules of the Road because most waterborne marine construction movement is on these waters.
Prerequisite: None

**Wld 1106—Welding and Burning I:** Welding demonstrations by the instructor and practice by students in the welding shop. Metallurgy of welding discussed. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding and flame cutting. Emphasis on electric arc and gas welding methods applicable to mechanical repair work. Brazing also covered.
Prerequisite: None

**Mro 1106—Practical Marine Engineering I:** Introduction to the principles and fundamentals of construction, operation, maintenance, and repair of diesel engines and their related equipment such as systems for fuel, lubrication, salt water and fresh water cooling. Also trouble shooting, maintenance, repair, and overhaul of various types of diesel engines will be studied.
Prerequisite: None

**Mro 1139—Rigging and Seamanship:** Fibers, synthetics, and wire ropes are studied with emphasis on strength, proper handling, and storage. The types of splicing used in fiber and wire slings will be demonstrated. Block and tackle combinations and mathematical formulas used to lift given weights will be taught in this course.
Prerequisite: None

**Mro 1140 Marine Safety—First Aid, Lifeboat Drills, and Firefighting Aboard Ship:** The U. S. Coast Guard Rules and Regulations regarding fire drills and lifeboat drills are thoroughly demonstrated to the student. Practical first aid is also included in the course.
Prerequisite: None

SECOND QUARTER

Mro 1102—Electronic Aids to Navigation: A course designed to provide the student with general information on the operational concept and capabilities of shipboard electronic equipment used for navigation, communication, oceanography, and fishery operations.
Prerequisite: None

Eng 1101-C—Communication Skills: Designed to aid the student in the improvement of self-expression in grammar. The approach is functional with emphasis on grammar, diction, sentence structure, punctuation, and spelling. Intended to stimulate students in applying the basic principles of English grammar in their day-to-day situations in industry and socal life.
Prerequisite: None

Mro 1107—Practical Marine Engineering II: A continuation of Mro 1106 with more responsibility given to the student as an operator of the power plants on the many boats and other equipment belonging to the school. More opportunities for operation, maintenance, repair and overhaul are offered to the student in this segment of the Marine Engineering course.
Prerequisite: Mro 1106

Cft 1101—Fishing Operations I: Designed to introduce the student to the fundamental concepts of fishing capturing devices on a commercial scale. A study of the various materials that nets and seines are made of and the reaction of marine animals upon encountering fish nets and traps. Basic net fabrication and net mending is included.
Prerequisite: None

Wld 1107—Welding and Burning II: This course is designed to familiarize the students with types of equipment, safety required, efficiency, cost of operations, and to stress the importance of being a qualified welder before taking the task of underwater welding, cutting, or burning. Emphasis will be placed on safety because of the hazards using extreme voltage and amperage around, above, and below the surface of fresh and salt water.
Prerequisite: Wld 1106

Elc 1106—Practical Marine Electricity I: An introduction to ship's power systems. The shore-tie is discussed and the ship's switchboards are studied. The differences in ship's wire and wiring systems from that of shoreside systems is covered in this course. Safety rules to avoid burns or electrocution are strictly enforced. Practical applications are emphasized throughout the course.
Prerequisite: None

THIRD QUARTER

Psy 1104—Job Adjustment Skills: This course is designed to familiarize the students with report writing, ordinary conversation, practical psychology, economics, labor relations, etc. It is intended to indoctrinate the student with the kinds of relationships he will encounter between employer and employee.
Prerequisite: None

Bus 1103—Small Business Operations: An introduction to the business world, problems of small business operation, basic business law, business forms and records, financial problems, ordering and inventorying, layout of equipment and offices, methods of improving business, and employer-employee relations.
Prerequisite: None

Cft 1102—Fishing Operations II: A continuation of Cft 1101 with special emphasis on fish traps, crab and lobster traps, and weirs. Setting and hauling seines is practiced and the use of the seine boat is demonstrated.
Prerequisite: Cft 1101

**Mro 1108—Practical Marine Engineering III:** A basic course introducing the student to the principles and fundamentals of construction, operation, and maintenance of diesel engines and other related machines used in the propulsion system of oceanographic vessels. The subject matter relative to this course will be based on the engines and auxiliary equipment found on board the school ship "SS Advance II".

Prerequisite: Mro 1107

**Dft 1111—Machine Trades Blueprint Reading & Sketching:** Interpretation and reading of blueprints, information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes.

Prerequisite: None

**Elc 1107—Practical Marine Electricity II:** Operation, maintenance, and repair of ship's generators including transfer of power and phasing is studied at this course. The student will study ship's wiring from distribution boards to equipment and lights, etc.

Prerequisite: Elc 1106

## FOURTH QUARTER

**Msc 2001—Marine Fishery Science and Seafood Handling:** Study of identification and classification of commercial marine fishes. General understandng of life cycles, population changes, and distributions as influenced by environmental factors. Additional study will be given in fish identification and fish tagging methods with an introducton to aquaculture and controlled rearing of commercially important marine species as a profitable business. Description of fisheries, fishing methods, fishing equipment, and methods of fish preservation will be covered.

Prerequisite: None

**Msc 1030—Advanced Navigation:** Practical problems in relative movement and use of The Maneuvering Board. Radar plotting and use of information obtained from the radar. An introduction to Celestial Navigation covering such topics as the celestial sphere, systems of coordinates, navigational triangles, lines of position and computed and observed altitudes.

Prerequisite: None

**Cft 1103—Fishing Operations III:** The Otter trawl and other bottom trawls are discussed in this section with special emphasis on net blueprints. The shrimp trawl is studied in great detail with the setting and retrieving of the net from a commercial-sized trawler demonstrated.

Prerequisite: Cft 1102

**Mro 1109—Practical Marine Engineering IV:** A continuation of Mro 1108 to enable the student to operate, maintain, and repair gasoline and diesel engines. Pumps and generators are also covered and marine refrigeration is introduced to the student at this time.

Prerequisite: Mro 1108

**Bio 1101—Marine Biology, Introduction:** A course designed to acquaint the student with the fundamentals of marine biology applicable to his field of work. Topics to be covered are basic marine biology, the biology of fouling organisms and their importance in marine industry, and basic water pollution to include state and federal pollution regulations.

Prerequisite: None

## DRAFTING — MECHANICAL

This curriculum is designed to prepare students to enter the field of mechanical drafting. The first two quarters contain courses basic to all fields of drafting. The third and fourth quarters contain specialization and related courses that prepare one to enter mechanical drafting occupations.

Each course is prepared to enable an individual to advance rapidly in drafting proficiency upon entering the field of work. Courses are arranged in sequence to develop drafting skills and proficiency in mathematics and science. The draftsman associates with many levels of personnel — administrative, architects, engineers, skilled workmen — and must be able to communicate effectively with them. Courses to develop knowledge and skills in communication, human relations, economics and industrial organization are provided to assist the student in developing understanding and confidence in his relations with other persons.

**A draftsman** prepares clear, complete, and accurate working plans and detail drawings, from rough or detailed sketches or notes for engineering or manufacturing purposes, according to the specified dimensions: makes final sketch of the proposed drawing, checking dimension of parts, materials to be used, the relation of one part to another, and the relation of the various parts to the whole structure. Makes any adjustments or changes necessary or desired. Inks in lines and letters on pencil drawings as required. Exercises manual skill in the manipulation of triangle, T-square, and other drafting tools. Lays tracing paper on drawing and traces drawing in pencil or ink. Makes charts for representation of statistical data. Makes finished designs from sketches. Utilizes knowledge of various machines, engineering practices, mathematics, building materials, and other physical sciences to complete the drawings.

**A mechanical draftsman** performs the general duties of a draftsman and also specializes in making rough drafting sketches of proposed mechanical devices, and then drawing necessary details. From specifications, he accurately draws the part or machine requested.

## DRAFTING — MECHANICAL

| | | Hours Per Week | | | Quarter Hours Credit |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | |
| DFT | 1121—Drafting | 3 | 0 | 15 | 8 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| ENG | 1101-C—Communication Skills | 2 | 0 | 0 | 2 |
| PHY | 1101—Applied Science | 3 | 2 | 0 | 3 |
| | | 13 | 2 | 15 | 18 |
| **SECOND QUARTER** | | | | | |
| DFT | 1122—Drafting | 3 | 0 | 15 | 8 |
| MAT | 1102—Applied Mathematics | 5 | 0 | 0 | 5 |
| ENG | 1102-C—Communication Skills | 2 | 0 | 0 | 2 |
| PHY | 1102—Applied Science | 3 | 2 | 0 | 3 |
| | | 13 | 2 | 15 | 18 |
| **THIRD QUARTER** | | | | | |
| DFT | 1131—Mechanical Drafting | 3 | 0 | 12 | 7 |
| MAT | 1104—Trigonometry | 3 | 0 | 0 | 3 |
| PSY | 1101—Human Relations | 3 | 0 | 0 | 3 |
| MEC | 1113—Shop Processes | 1 | 0 | 3 | 2 |
| MEC | 1115—Applied Metallurgy | 2 | 0 | 3 | 3 |
| | | 12 | 0 | 18 | 18 |
| **FOURTH QUARTER** | | | | | |
| DFT | 1132—Mechanical Drafting | 3 | 0 | 12 | 7 |
| MEC | 1114—Shop Processes | 1 | 0 | 3 | 2 |
| MEC | 1116—Applied Metallurgy | 2 | 0 | 3 | 3 |
| BUS | 1105—Industrial Organization | 3 | 0 | 0 | 3 |
| MAT | 1124—Slide Rule | 3 | 0 | 0 | 3 |
| | | 12 | 0 | 18 | 18 |

PRE-REVISION

# DRAFTING — MECHANICAL

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

Dft 1121—Drafting: An introduction to drafting and the study of drafting practices. Instruction is given in the selection, use and care of instruments, singlestroke lettering, applied geometry, freehand sketching consisting of orthographic and pictorial drawings. Orthographic projection, reading and instrument drawing of principal views, single auxiliary views (primary), and double (oblique) auxiliary views will be emphasized. Dimensioning and note practices will be studied with reference to the American Standards Association practices. Methods of reproducing drawings will be included at the appropriate time.
Prerequisite: None

Mat 1101—Applied Mathematics: Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

Eng 1101-C—Communication Skills: The first of two courses designed to improve the student's abilities in all areas of communications. Emphasis during the first quarter will be placed on the development of improved reading habits and basic composition skills.
Prerequisite: None

Phy 1101—Applied Science: An introduction to physical principles and their application in industry. Topics in this course include measurement: properties of solids, liquids, and gases; basic electrical principles.
Prerequisite: None

### SECOND QUARTER

Dft 1122—Drafting: The trainee will study simple and successive revolutions and their applications to practical problems. Sections and conventions will be studied and both detail and assembly sections will be drawn. Intersections and developments will be studied by relating the drawing to the sheet metal trades. Models of the assigned drawings will be made from construction paper, cardboard, or similar materials as a proof of the solution to the problems drawn. Methods of drawing and projected axonometric, oblique, and perspective drawings will be studied with emphasis on the practical applications of pictorial drawings. Various methods of shading will be introduced and dimensioning and sectioning of oblique and axonometric pictorials will be done.
Prerequisite: Dft 1121

Mat 1102—Applied Mathematics: Basic concepts and operations of algebra: historical backgrounds of our base-10 number system; algebraic operations; addition, subtraction, multiplication and division; fractions, letter representation, grouping, factoring, ratio and proportions, variation; graphical and algebraic solution of first degree equations; solution of simultaneous equations by: addition and subtraction, substitution, graphing; exponents, logarithms, tables and interpolation.
Prerequisite: Mat 1101

**Eng 1102-C—Communication Skills:** A continuation of Eng 1101. In addition to reading and writing, the principles of effective speech will be practiced. Writing practice will include the filling out of job applications, composing personal history, statements, writing request for references, and then procedures related to job acquisition.
Prerequisite: Eng 1101-C

**Phy 1102—Applied Science:** The second in a series of two courses of applied physical principles. Topics introduced in this course are heat and thermometry, and principles of force, motion, work, energy, and power.
Prerequisite: Phy 1101

## THIRD QUARTER

**Dft 1131—Mechnical Drafting:** A continuation of mechanical drafting beginning with problems concerning precision and limit dimensioning. Methods of fastening materials, and fasteners: keys, rivets, springs, and welding. Symbols will be studied and drawings will be made involving these items. Principles of design will be introduced with the study of basic mechanisms of motion transfer; gears, cams, power trains, pulleys, belting and methods of specifying and calculating dimensions will be studied. Drawings will be made involving these mechanisms.
Prerequisite: Dft 1122

**Mat 1104—Trigonometry:** Trigonometric ratios; solving problems with right triangles, using tables, and interpolating; solution of oblique triangles using law of sines and law of cosines; graphs of the trigonometric functions; inverse functions, trigonometric equations. All topics are applied in practical problems.
Prerequisites: Mat 1101, Mat 1102

**Psy 1101—Human Relations:** A study of basic principles of human behavior. The problems of the individual are studied in relation to society, group membership, and relationship within the work situation.
Prerequisite: None

**Mec 1113—Shop Processes:** Study of practices used in metalworking shops: introduction to how materials can be utilized, and to the processes of shaping, forming and fabricating of metals. Demonstration of the metalworking lathes, grinders, drills, milling machines, shapers, planers, saws, broachers, gear-cutting machines and finishing machines. A study of the capabilities of these machines.
Prerequisite: None

**Mec 1115—Applied Metallurgy:** Investigates the properties of ferrous metals and tests to determine their uses. Instructions will include some chemical metallurgy to provide a background for the understanding of the physical changes and causes of these changes in metals. Physical metallurgy of ferrous metals, producing iron and steel, theory of alloys, shaping and forming, heat treatments for steel, surface treatments, alloy of special steel, classification of steels, and cast iron will be topics for study.
Prerequisite: None

## FOURTH QUARTER

**Dft 1132—Mechanical Drafting:** Principles of design sketching, design drawings, layout drafting, detailing from layout drawings, production drawings and simplified drafting practices constitute areas of study. Forging and casting drawings will be made from layouts. Specifications, parts list and bill of materials are emphasized in this course. The student will develop a complete set of working drawings of a tool, jig, fixture or simple machine and learn principles of design, handbook and manual usage.
Prerequisite: Dft 1131

Mec 1114—Shop Processes: Comparison of the unit-production and mass-production systems. Casting, forging and allied processes, welding and sheet metal working processes are demonstrated and discussed. Mass-production methods are studied in relationship to precision dimensional control.
Prerequisite: Mec 1113

Mec 1116—Applied Metallurgy: Continuation of the study of physical metallurgy. The non-ferrous metals; bearing metals (brass, bronze, lead), light metals (aluminum and magnesium) and copper and its alloys are studied. Powder metallurgy, titanium, zirconium, indium and vanadium are included in this course.
Prerequisite: Mec 1115

Bus 1105—Industrial Organizations: Methods, techniques, and practices of modern management in planning, organizing and controlling operations of a manufacturing concern. Introduction to the competitive system and the factors constituting product cost.
Prerequisite: None

Mat 1124—Slide Rule: An introductory slide rule course starting with multiplication and division going into more complicated mathematics. Students will also master the use of a slide rule in calculating squares and square roots, cubes and cube roots, and reciprocals.
Prerequisite: None

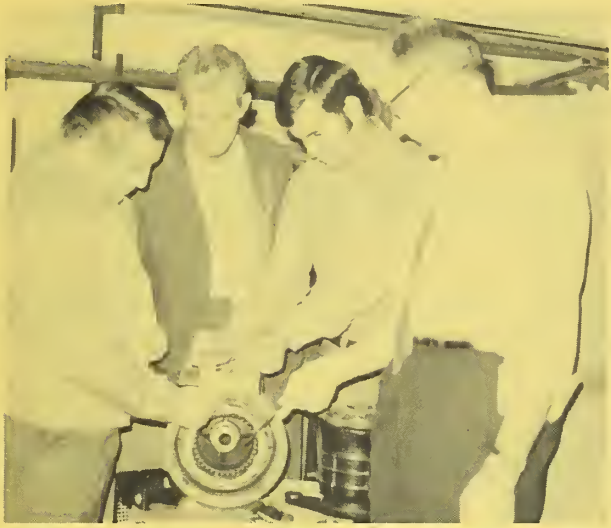
## HEATING AND AIR CONDITIONING

Through this curriculum the Cape Fear Technical Institute provides a training program for the instruction of students in the basic knowledges and skills involved in servicing and installing heating and air conditioning equipment. Manual skills are emphasized in practical shop work combined with a thorough understanding of the operating principles involved in heating and air conditioning.

The heating and air conditioning industry is one of the fastest growing fields today. With the ever-increasing use of air conditioning in industries and the even faster growing use of air conditioning and heating systems in domestic use, the need for service people to install and maintain this equipment has surpassed the available supply of trained personnel. This need for trained people has become so great that a program for training is necessary. Because of the increasing engineering complexity caused by the demand for more efficient, more compact, and dual capacity units, this curriculum to train people and to upgrade present-day servicemen has been prepared.

In North Carolina a contractor in the heating and air conditioning field is required by law to hold a state license. The serviceman or mechanic is not required to hold a license. The material presented herein is basic to the passing of this state's license examination. With job experience, a graduate should be able to successfully pass the examination and acquire a contractor's license.

The heating and air conditioning mechanic installs, services and repairs equipment used in the heating and cooling of domestic buildings, industrial buildings and mobile-type units. In general, a person will perform similar duties in any one of these fields, but often becomes a specialist in one. The mechanic uses blueprints and schematics, thus requiring a knowledge of blueprint reading. He services, installs, and maintains cooling components, heating devices, air and liquid flow devices used in comfort heating of air and liquids, and fuel storage units. The duties may involve mechanical repairs, electrical motor repairs, control wiring, electrical and gas tests, pipe and tubing fitting, duct and fitting fabrication, equipment installation, shop sketching of equipment and flow devices for installations, and equipment sizing.



## HEATING AND AIR CONDITIONING

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| AHR | 1116--Oil Burner Installation and Service | 4 | 0 | 6 | 6 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 3 |
| ELC | 1102-C—Applied Electricity—Part I | 3 | 0 | 0 | 3 |
| DFT | 1104-C—Blueprint Reading | 2 | 0 | 0 | 2 |
| AHR | 1121-C—Principles of Refrigeration—Part I | 2 | 0 | 3 | 3 |
| | | 16 | 0 | 9 | 19 |
| **SECOND QUARTER** | | | | | |
| AHR | 1117—Gas Burners, Electric Heat & Liquid Heat Applications | 4 | 0 | 3 | 5 |
| AHR | 1125—Principles of Refrigeration—Part II | 3 | 0 | 6 | 5 |
| ELC | 1103-C—Applied Electricity—Part II | 2 | 0 | 0 | 2 |
| DFT | 1116-C—Blueprint Reading: Air Conditioning | 1 | 0 | 3 | 1 |
| WLD | 1102—Basic Gas Welding | 0 | 0 | 3 | 1 |
| | | 10 | 0 | 15 | 15 |
| **THIRD QUARTER** | | | | | |
| AHR | 1124-C—Air Conditioning Service | 2 | 0 | 9 | 5 |
| PHY | 1101-C—Applied Science | 3 | 0 | 0 | 3 |
| AHR | 1123—Principles of Air Conditioning | 3 | 0 | 3 | 4 |
| MAT | 1102—Applied Mathematics | 5 | 0 | 0 | 5 |
| | | 13 | 0 | 12 | 17 |
| **FOURTH QUARTER** | | | | | |
| AHR | 1126—All Year Comfort Systems | 3 | 0 | 9 | 6 |
| AHR | 1109—Job Planning and Estimating | 2 | 0 | 0 | 2 |
| PSY | 1101—Human Relations | 3 | 0 | 0 | 2 |
| AHR | 1128—Automatic Controls | 3 | 0 | 6 | 5 |
| | | 10 | 0 | 15 | 15 |

# HEATING AND AIR CONDITIONING

## COURSE DESCRIPTION BY QUARTERS

### FIRST QUARTER

**Ahr 1116—Oil Burner Installation and Service:** An introduction to the principle of heating, terminology, and the use and repair of equipment. Also included will be maintenance and service of heating units and diagnosing troubles within installation. Thermostat controls are also a part of this course.
Prerequisite: None

**Mat 1101—Applied Mathematics:** Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

**Elc 1102-C—Applied Electricity—Part I:** Introduction to basic theories and principles of electricity. Basic electric control circuits, Ohm's Law, series and parallel circuits.
Prerequisite: None

**Dft 1104-C—Blueprint Reading:** Interpretation and reading of blueprints. Information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes.
Prerequisite: None

**Ahr 1121-C—Principles of Refrigeration (Part I):** An introduction to the principles of refrigeration, terminology, the use and care of tools and equipment, and the identification and the function of the component parts of a system. Other topics to be included will be the basic laws of refrigeration; characteristics, and comparison of the various refrigerants; the use and construction of valves, fittings, and basic controls. Practical work includes tube bending, flaring and soldering. Standard procedures and safety measures are stressed in the use of special refrigeration service equipment and the handling of refrigerants.
Prerequisite: None

### SECOND QUARTER

**Ahr 1117—Gas Burners, Electric Heat and Liquid Heat Applications:** An introduction to the principles of heating with the use of gas, electric, or liquid heat units. The course includes installation and service to the above forms of heating units. The course will also include servicing and corrective maintenance techniques as it applies to the above three forms of heating units.
Prerequisite: None

**Ahr 1125—Principles of Refrigeration (Part II):** A continuation and more advanced study in refrigeration principles.
Prerequisite: Ahr 1121-C

**Elc 1103-C—Applied Electricity (Part II):** The use and care of test instruments and equipment used in servicing electrical apparatus for air conditioning and refrigeration installations. Electrical principles and procedures for trouble-shooting of the various electrical devices used in air conditioning, heating and refrigeration equipment. Included will be transformers, various types of motors and starting devices, switches, electrical heating devices and wiring.
Prerequisite: Elc 1102-C

Dft 1116-C—Blueprint Reading: Air Conditioning: A specialized course in drafting for the heating and air conditioning student. Emphasis will be placed on reading of blueprints that are common to the trade; blueprints of mechanical components, assembly drawings, wiring diagrams and schematics, floor plans, heating system plans including duct and layout air conditioning systems.
Prerequisite: Dft 1104

Wld 1102—Basic Gas Welding: Welding demonstrations by the instructor and practice by the students in the welding shop. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding; bronze welding, silver-soldering, and flame-cutting methods applicable to mechanical repair work.
Prerequisite: None

## THIRD QUARTER

Ahr 1124-C—Air Conditioning Servicing: Emphasis is placed on the installation, maintenance, and servicing of equipment used in the cleaning, changing, humidification and temperature control of air in an air conditioned space. Installation of various ducts and lines needed to connect various components is made. Shop work involves controls, testing and adjusting of air conditioning equipment, and location and correction of equipment failure.
Prerequisite: None

Phy 1101-C—Applied Science: An introduction to physical principles and their application in industry. Topics in this course include measurement; properties of solids, liquids, and gases; basic electrical principles. This is basically the same course as Phy 1101 except no lab is required. The extra lecture hour is used in lieu of lab for demonstrations from which data is taken and written up.
Prerequisite: None

Ahr 1123—Principles of Air Conditioning: Emphasis is placed on the installation, maintenance, and servicing of equipment used in the cleaning, changing, humidification and temperature control of air in an air conditioned space. Installation of various ducts and lines needed to connect various components is made.
Prerequisite: None

Mat 1102—Applied Mathematics: Basic concepts and operations of algebra: historical background of our base-10 number system; algebraic operations; addition, subtraction, multiplication and division; fractions, letter representation, grouping, factoring, ratio and proportions, variation; graphical and algebraic solution of first degree equations; solution of simultaneous equations by: addition and subtraction, substitution, graphing; exponents, logarithms, tables and interpolation.
Prequisite: Mat 1101

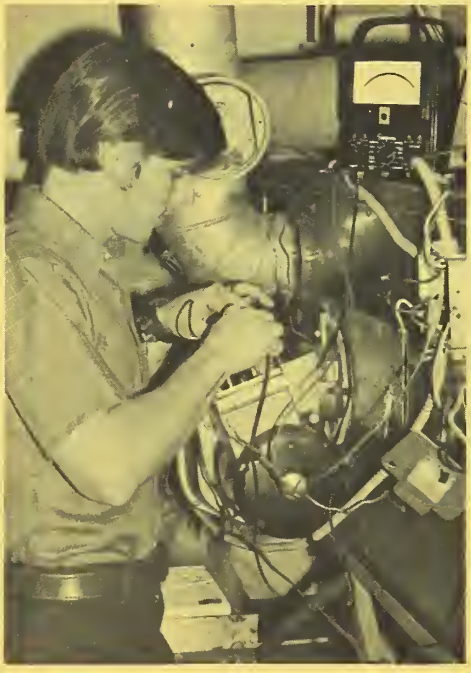
## FOURTH QUARTER

Ahr 1126—All Year Comfort Systems: Auxiliary equipment used in conjunction with refrigeration systems to provide both heating and cooling for "all year" comfort will be studied and set up in the laboratory. Included will be oil fired systems, gas fired systems, water circulating systems, and electric-resistance systems. Installation of heat pumps will be studied along with servicing techniques. Reversing valves, special types of thermostatic expansion valves, systems of de-icing coils, and electric wiring and controls are included in the study.
Prerequisite: None

Ahr 1109—Job Planning and Estimating: Estimating loads and capacity of refrigeration and cooling units through the use of manuals, tables, and charts. Students will be expected to acquire sufficient knowledge to determine and recommend the adequate sizing of cooling units for specific uses either in homes or industry.
Prerequisite: Mat 1101

Psy 1101—Human Relations: A study of basic principles of human behavior. The problems of the individual are studied in relation to society, group membership, and relationship within the work situation.
Prerequisite: None

Ahr 1128—Automatic Controls: The study of various control thermostat systems used by manufacturers for the installation of their equipment. This course includes resetting and calibrating of control units used on the various heating systems. The principles of how these controls work is also discussed.
Prerequisite: None



## HEAVY EQUIPMENT MECHANICS

The Heavy Equipment Mechanics curricula provides training opportunities for developing the basic knowledge and skills required for diagnosing, testing, repairing, servicing and replacing the major components of heavy automotive equipment.

Diesel and gasoline engines; fuel, electrical, and hydraulic systems; power trains and undercarriages are studied with oxyacetylene heating and burning, schematics and diagrams, and other subjects vital to a well trained heavy equipment mechanic.

All students train in Cape Fear Technical Institute's classrooms and laboratories during the first academic quarter of the curriculum. The remaining three quarters constitute the work experience phases, during which half of the class train at Cape Fear Technical Institute for half of each quarter while the remaining half work as paid, full-time, on-the-job trainees in the maintenance shop of a heavy equipment sales and service dealership. After five and one-half weeks, mid-point of each quarter, the group training with a dealer is replaced by the second group which has been training at Cape Fear Technical Institute. This "work experience" feature of the program provides practical instruction as well as a means for the student to finance a large part of his educational or other expenses.

# HEAVY EQUIPMENT MECHANICS

## (FULL-TIME CO-OPERATIVE)

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| ENG | 1101—Reading Improvement | 2 | 0 | 0 | 2 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| PME | 1107-C—Internal Combustion Engines—Gasoline & Diesel | 3 | 0 | 6 | 5 |
| PHY | 1101-C—Applied Science | 3 | 0 | 0 | 3 |
| PME | 1136—Fundamentals of Hydraulics | 5 | 0 | 6 | 7 |
| | | 18 | 0 | 12 | 22 |
| **SECOND QUARTER** (Class, 5½ Weeks; CO-OP, 5½ Weeks) | | | | | |
| PME | 1131—Schematics and Diagrams | 2 | 4 | 0 | 2 |
| ELC | 1135-C—Base Electricity | 4 | 0 | 6 | 3 |
| ENG | 1102-C—Communication Skills | 4 | 0 | 0 | 2 |
| PME | 1139—Hydraulics, Air and Vacuum | 4 | 2 | 0 | 3 |
| WLD | 1120-C—Oxyacetylene Heating and Burning | 0 | 4 | 0 | 2 |
| WKE | 1001—Work Experience (5½ weeks, 40 hours per week) | - | - | - | 2 |
| | | 14 | 10 | 6 | 14 |
| **THIRD QUARTER** (Class, 5½ Weeks; CO-OP, 5½ Weeks) | | | | | |
| PME | 1134—Electric Systems—Mobile Equipment | 4 | 0 | 12 | 4 |
| PME | 1135—Basic Fuel Systems Gasoline and Diesel | 4 | 4 | 0 | 4 |
| PME | 1108-C—Undercarriages | 2 | 4 | 0 | 2 |
| WKE | 1002—Work Experience (5½ weeks, 40 hours per week) | - | - | - | 2 |
| | | 10 | 8 | 12 | 12 |
| **FOURTH QUARTER** (Class, 5½ Weeks; CO-OP, 5½ Weeks) | | | | | |
| BUS | 1103—Small Business Operations | 6 | 0 | 0 | 3 |
| PME | 1137-C—Basic Power Transmissions | 4 | 0 | 12 | 4 |
| PME | 1138-C—Requisition of Parts Heavy Equipment | 2 | 4 | 0 | 2 |
| PSY | 1101—Human Relations | 4 | 0 | 0 | 2 |
| WKE | 1003—Work Experience (5½ weeks, 40 hours per week) | - | - | - | 2 |
| | | 16 | 4 | 10 | 13 |

# HEAVY EQUIPMENT MECHANICS

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

**Eng 1101—Reading Improvement:** A concentrated and sustained effort to improve the student's ability to read and to comprehend what he reads. Includes vocabulary building, grammar, sentence structure, paragraph development, and oral communication. The course is intended to stimulate students in applying these skills in further study and in their day-to-day situations in industry and social life.
Prerequisite: None

Mat 1101—Applied Mathematics: Practical number theory. Analysis of basic operations: addition, subtraction, multiplication, and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometry figures used in industry; measurements of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

Pme 1107-C—Internal Combustion Engines—Gasoline and Diesel: Development of a thorough knowledge and ability in using, maintaining and storing various hand tools and devices needed in engine repair work; proper cleaning of various types of metals used in engine construction and safety rules in handling and cleaning components. Study of the construction and operation of components of the internal combustion engines. Testing of engine performance, servicing and maintenance of pistons, sleeves, valves, cams and camshafts, fuel and exhaust systems, oil pumps. Cooling systems, proper lubrications, and methods of testing, diagnosing and repairs.
Prerequisite: None

Phy 1101-C—Applied Science: An introduction to physical principles and their application in industry. Topics in this course include measurement; properties of solids, liquids, and gases; basic electrical principles. This is basically the same course as Phy 1101 except no lab is required. The extra lecture hour is used in lieu of lab for demonstrations which data is taken and written up.
Prerequisite: None

Pme 1136—Fundamentals of Hydraulics: Fundamentals of hydraulics and its use to transmit power. Study of components and their function; pumps, lines, cylinders, valves, gauges and controls. Proper care, use, installation and storage of test equipment. Minor repairs, assembly removal and replacement.
Prerequisite: None

SECOND QUARTER

Pme 1131—Schematics and Diagrams: Interpretation and reading of blueprints. Development of ability to read and interpret blueprints, charts, instruction and service manuals, and wiring diagrams. Information on the basic principles of lines, views, dimensioning procedures, and notes.
Prerequisite: None

Elc 1135-C—Basic Electricity: Principles of direct current including: Units of electrical measurement—volts, ohms, amps and watts; electrical components, their symbol and use, in series, parallel and series parallel circuits; wire sizes, types and types of insulation. Laboratory work includes wiring circuits from schematics and use and care of electrical measuring devices.
Prerequisite: None

Eng 1102-C—Communication Skills: This course is designed to improve the students' abilities in areas of communication. In addition to reading and writing, the principles of effective speech will be practiced. Writing practice will include heavy equipment terminology, definitions, procedures related to employment acquisition.
Prerequisite: Eng 1101

Pme 1139—Hydraulics, Air and Vacuum: A continuation of Pme 1136. Air and vacuum controls are introduced in this course. A working knowledge of operational and controls system is acquired. Systems servicing, test points, testing and adjusting through the use of instruments and equipment according to outlined procedures.
Prerequisite: Pme 1136

Wld 1120-C—Oxyacetylene Heating and Burning: Introduction to the history of oxyacetylene welding, the principles of welding and cutting, nomenclature of the equipment, assembly of unit. Welding procedures such as practice of puddling and carrying the puddle, running flat beads, butt welding in the flat, vertical and overhead positions, brazing, hard and soft soldering. Safety procedures are stressed throughout the program of instruction.
Prerequisite: None

**Wke 1001—Work Experience:** Beginning work experience assisting journeyman mechanics in heavy equipment service and repair. Disassembly, cleaning, and component identification of gasoline and diesel engines. Major and minor reconditioning of undercarriage components including rebuilding, assembly, alignment and adjustment.
Prerequisite: None

**THIRD QUARTER**

**Pme 1134—Electrical Systems—Mobile Equipment:** A thorough study of the electrical systems of mobile equipment. Batteries, starters, switches and controls. Charging systems including generators, alternators, and voltage regulators. Ignition systems, battery operated and magneto. Wiring systems to include all cables, wires, switches, ammeter, gauges, sending units, solenoids, accessories, and lights.
Prerequisite: Elc 1135-C

**Pme 1135—Basic Fuel Systems—Gasoline and Diesel:** A thorough study of the fundamentals of gasoline and diesel fuel systems. Classroom lecture on carburetors and diesel injection systems; principles and functions of components. Laboratory practice in application of service, repair, and diagnosis procedures. Assembly removal and replacement.
Prerequisite: None

**Pme 1108-C—Undercarriage:** Basic function and operation of the components of a crawler tractor undercarriage: rollers, idlers, drive sprockets, pine, bushings, tracklinks and trackshoes. Identification of wear points and causes of wear, measuring procedures, adjustment, repair and replacement.
Prerequisite: None

**Wke 1002—Work Experience:** Intermediate work experience assisting journeymen mechanics in repairing diesel and gasoline engines. Identification of serviceable components, reassembly and installation of engine units. Adjusments and servicing of engines for optimum operation. Preventive maintenance of both gasoline and diesel engines.
Prerequisite: None

**FOURTH QUARTER**

**Bus 1103—Small Business Operations:** An introduction to the business world, problems of small business operation, basic business law, business forms and record, financial problems, ordering and inventorying, layout of equipment and offices, methods of improving business and employer-employee relations.
Prerequisite: None

**Pme 1137-C—Basic Power Transmissions:** Basic function and operation of major components used to transmit power on heavy mobile equipment. Clutches, Transmissions, Planetary Gearing, Torque Converters, Final Drives, Hydrostatic Drives, Servicing, Testing, Minor Adjustment, Assembly Removal and Replacement.
Prerequisite: None

**Pme 1138-C—Requisition of Parts Heavy Equipment:** Preparation of replacement parts list for equipment being repaired. Includes identification of individual parts, sub-assembly or assembly by nomenclature and part number with correct parts book. Students will prepare order form with parts book and order forms supplied.
Prerequisites: Eng 1101, Eng 1102-C

**Psy 1101—Human Relations:** A study of basic principles of human behavior. The problems of the individual are studied in relation to society, group membership, and relationships within the work situation.
Prerequisite: None

**Wke 1003—Work Experience:** Advanced work experience assisting journeymen mechanics in repairing mobile equipment electrical and fuel systems. Testing, diagnosing, adjusting, and repairing components such as; starters, alternators, generators, regulators, fuel injectors, and fuel pumps.
Prerequisite: None

## INDUSTRIAL AIR CONDITIONING (Specialty)

The Industrial Air Conditioning curriculum is a special offering by the Institute designed to provide the student with basic knowledge and skills which will enable him to become employed in industry as an air conditioning maintenance and service man.

The application of various types of air conditioning and compressor units by industry has been on the increase as firms endeavor to upgrade quality control and the working environments of their employees.

Individuals knowledgeable and with skills in industrial air conditioning are generally employed and assigned to the firm's maintenance department with responsibilities towards maintaining the plant physical facilities and equipment.

## INDUSTRIAL AIR CONDITIONING (Specialty)

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| AHR | 1101—Industrial Air Conditioning I | 3 | 0 | 12 | 7 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| DFT | 1104-C—Blueprint Reading | 0 | 2 | 0 | 1 |
| | | 8 | 2 | 12 | 12 |
| **SECOND QUARTER** | | | | | |
| AHR | 1102—Industrial Air Conditioning II | 4 | 0 | 9 | 7 |
| MAT | 1102—Applied Mathematics | 5 | 0 | 0 | 5 |
| DFT | 1116-C—Blueprint Reading: Air Conditioning | 2 | 2 | 0 | 3 |
| | | 11 | 2 | 9 | 15 |

## INDUSTRIAL AIR CONDITIONING (Specialty)

### COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

**Ahr 1101—Industrial Air Conditioning I:** An introduction to industrial air conditioning deals with the control of temperature, humidity and air distribution equipment and maintenance of this equipment.

Prerequsite: None

**Mat 1101—Applied Mathematics:** Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.

Prerequisite: None

**Dft 1104-C—Blueprint Reading:** Interpretation and reading of blueprints. Information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes.

Prerequisite: None

### SECOND QUARTER

**Ahr 1102—Industrial Air Conditioning II:** A continuation of Ahr 1101. An introduction to psychrometric properties, the science of air conditioning, heat gain calculation and equipment sizing.

Prerequisite: Ahr 1101

**Mat 1102—Applied Mathematics:** Basic concepts and operations of algebra: historical background of our base-10 number system; algebraic operations; addition, subtraction, multiplication and division; fractions, letter representation, grouping, factoring, ratio and proportions, variation; graphical and algebraic solution of first degree equations; solution of simultaneous equations by: addition and subtraction, substitution, graphing; exponents, logarithms, tables and interpolation.

Prerequisite: Mat 1101

**Dft 1116-C—Blueprint Reading: Air Conditioning:** A specialized course in drafting for the heating, air conditioning and refrigeration student. Emphasis will be placed on reading of blueprints that are common to the trade; blueprints of mechanical components, assembly drawings, wiring diagrams and schematics, floor plans, heating system plans including duct and equipment layout plans, and shop sketches. The student will make tracings of floor plans and layout air conditioning systems.

Prerequisite: Dft 1104

## INDUSTRIAL MACHINE OPERATOR (Specialty)

The Industrial Machine Operator curriculum is a special curriculum designed to provide the student with the basic knowledge and skills that will enable him to enter industry as a machine operator.

Emphasis is placed on machine shop hand tools, measuring instruments, machine safety, operation and nomenclature. Included also is emphasis on mathematics as applied to a machine shop and blueprint reading as applied to a typical machine shop.

This curriculum is a two quarter curriculum (6 months) designed to enable the new employee to communicate well and carry out all responsibilities assigned to him by his immediate supervisor while he works as a machine operator.

## INDUSTRIAL MACHINE OPERATOR (Specialty)

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| FIRST QUARTER | | Class | Lab | Shop | Credit |
| MEC | 1131—Industrial Machine Operator I | 3 | 0 | 9 | 6 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| DFT | 1104—Blueprint Reading | 2 | 0 | 3 | 3 |
| | | 10 | 0 | 12 | 14 |
| SECOND QUARTER | | | | | |
| MEC | 1132—Industrial Machine Operator II | 5 | 0 | 9 | 8 |
| MAT | 1102—Applied Mathematics | 5 | 0 | 0 | 5 |
| DFT | 1105—Blueprint Reading | 0 | 0 | 3 | 1 |
| | | 10 | 0 | 12 | 14 |

## INDUSTRIAL MACHINE OPERATOR (Specialty)

### COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

**Mech 1131—Industrial Machine Operator I:** An introduction to the Industrial Machine Operator Trade. Deals primarily with identification, care, and use of basic precision measuring instruments used in a quality controlled setting. Also included are elementary procedures and operations of drill press, saws, and lathe, both in theory and practice.
Prerequisite: None

**Mat 1101—Applied Mathematics:** Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers, and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

**Dft 1104—Blueprint Reading:** Interpretation and reading of blueprints. Information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes.
Prerequsite: None

### SECOND QUARTER

**Mec 1132—Industrial Machine Operator II:** An introduction to elementary procedures of various types of grinding machines, milling machines, holding devices, and accessories. Advanced procedures on lathe processes, quality control methods, and precision measuring instruments.
Prerequisite: Mec 1131

**Mat 1102—Applied Mathematics:** Basic concepts and operations of algebra: historical background of our base-10 number system; algebraic operations; addition, subtraction, multiplication and division; fractions, letter representation, grouping, factoring, ratio and proportions, variation; graphical and algebraic solution of first degree equations; solution of simultaneous equations by: addition and subtraction, substitution, graphing; exponents, logarithms, tables and interpolation.
Prerequisite: Mat 1101

**Dft 1105—Blueprint Reading:** Further practice in interpretation of blueprints as they are used in industry; study of prints supplied by industry; making plans of operations; introduction to drafting room procedures; sketching as a means of passing on ideas, information and processes.
Prerequisite: Dft 1104

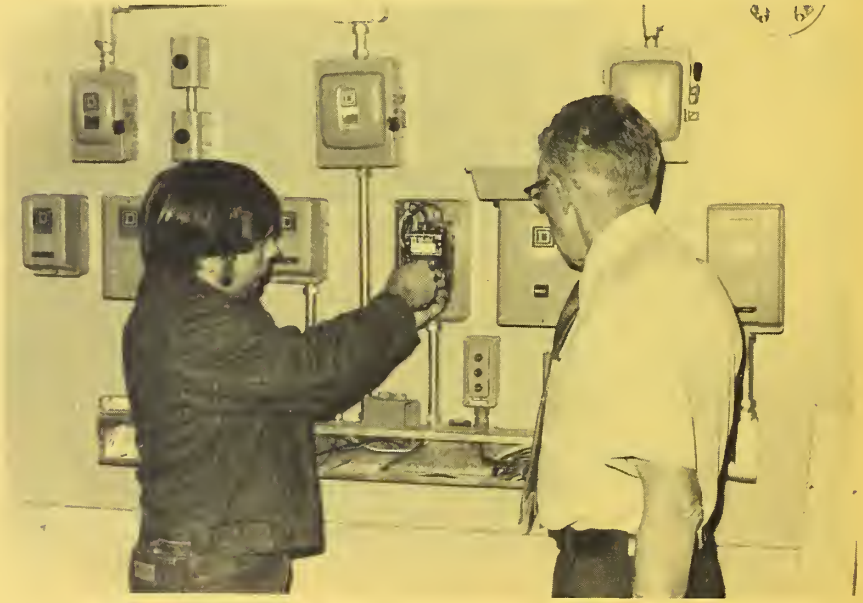
## INDUSTRIAL ELECTRICITY

Industrial electricians maintain and repair many different types of electrical equipment. In addition, they sometimes modify and install electrical equipment such as motors, transformers, generators, controls, instruments, and lighting systems used in industries.

A large part of an industrial electrician's work is preventive maintenance—periodic inspection of equipment to find and repair defects before breakdowns occur. When trouble does develop, he must find and repair the faulty circuit or equipment quickly in order to prevent costly production losses and inconvenience. It is the electrician's responsibility also to insure that electrical systems are so installed that hazards to equipment and personnel are held to a minimum.

In his daily work, the industrial electrician does many different things. For example, he may make repairs by replacing units or parts such as wiring, fuses, circuit breakers, coils, or switches. While doing repair or installation work, the electrician may connect wires by splicing or by using mechanical connectors. He may measure, cut, bend, thread, and install conduits through which wires are run to outlets, panels, and boxes. He also may adjust equipment controls and check and adjust instruments.

Industrial electricians are employed in every State. Large numbers work in heavily industrialized States.



## INDUSTRIAL ELECTRICITY

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| ELC | 1104—Basic Electricity I | 5 | 0 | 9 | 8 |
| ELN | 1106—Instrument Familiarization | 3 | 0 | 6 | 5 |
| ENG | 1101-C—Communication Skills | 2 | 0 | 0 | 2 |
| MAT | 1116—Industrial Electrical Mathematics | 5 | 0 | 0 | 5 |
| | | 15 | 0 | 15 | 20 |
| **SECOND QUARTER** | | | | | |
| ELC | 1105—Basic Electricity II | 5 | 0 | 9 | 8 |
| ELN | 1111—Electro-Mechanical Relays and Symbols | 3 | 0 | 6 | 5 |
| ENG | 1102-C—Communication Skills | 2 | 0 | 0 | 2 |
| MAT | 1125—Industrial Calculations | 5 | 0 | 0 | 5 |
| | | 15 | 0 | 15 | 20 |
| **THIRD QUARTER** | | | | | |
| ELC | 1115—AC and DC Machinery | 5 | 0 | 9 | 8 |
| ELC | 1116—Motor Control | 3 | 0 | 6 | 5 |
| PSY | 1101—Human Relations | 2 | 0 | 0 | 2 |
| DFT | 1109—Schematics and Wiring Diagrams | 2 | 0 | 3 | 3 |
| | | 12 | 0 | 18 | 18 |
| **FOURTH QUARTER** | | | | | |
| ELC | 1125—Industrial Wiring Practices | 5 | 0 | 6 | 7 |
| ELN | 1130—Solid State Devices, Circuits and Symbols | 5 | 0 | 6 | 7 |
| DFT | 1108-C—Blueprint Reading | 2 | 0 | 3 | 3 |
| ELC | 1130—Field Trips, Industrial Installations | 0 | 0 | 3 | 1 |
| | | 12 | 0 | 18 | 18 |

## INDUSTRIAL ELECTRICITY

### COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

**Elc 1104—Basic Electricity I:** Introduction to basic theories and principles of electricity. Basic electric units, symbols and Ohm's Law regarding series and parallel circuits.

Prerequisite: None

**Eln 1106—Instrument Familiarization:** Functional use of various tools and test equipment used in the electrical field.

Prerequisite: None

**Eng 1101-C—Communication Skills:** The first of two courses designed to improve the students' abilities in all areas of communications. Emphasis during the first quarter will be placed on the development of improved reading habits and basic composition skills.

Prerequisite: None

**Mat 1116—Industrial Electrical Mathematics:** The general area of basic mathematical concepts is presented, including an introduction to the set of real numbers and the base-10. Also, common principles learned is stressed in practical problems.

Prerequisite: None

SECOND QUARTER

Elc 1105—Basic Electricity II: Introduction to alternating current theory, sine wave generation and analysis, induction, reactance, impedance, phase relations, transformers, and power factor corrections.
Prerequisite: Elc 1104

Eln 1111—Electro-Mechanical Relays and Symbols: Introduction to various types of relays (AC and DC), operating principles and characteristics. Various relay symbols are introduced. Maintenance and construction of relays are studied.
Prerequisite: Eln 1106

Eng 1102-C—Communication Skills: A continuation of Eng 1101-C. In addition to reading and writing the principles of effective speech will be practiced. Writing practice will include filling out job applications, composing personal history, statements, writing requests for references, and then procedures related to job acquisition.
Prerequisite: Eng 1101-C

Mat 1125—Industrial Calculations: Various problems involving calculations of wire sizes, electrical loads (power), feeders, voltages and currents in various transformer configurations, power costs, installation costs, and projected maintenance costs.
Prerequisite: Mat 1116

THIRD QUARTER

Elc 1115—AC and DC Machinery: AC and DC motors, generators, voltage and current regulations, speed control, reversing and braking systems, and characteristics are studied. The student will physically set up and wire various systems and then collect data to determine characteristics and efficiency of system.
Prerequisite: Elc 1104

Elc 1116—Motor Control: Introduction to control components, i.e., contractors, motor starters, pilot devices, code considerations, types of control, control circuits, analysis of control circuits, maintenance and troubleshooting of motor and control circuits including solid state.
Prerequisite: Eln 1111

Psy 1101—Human Relations: A study of the basic principles of human behavior. The problems of the individual are studied in relation to society, group membership and relations within the work situation.
Prerequisite: Eng 1102-C

Dft 1109—Schematics and Wiring Diagrams: Electrical symbols, schematics and diagrams are sketched, labeled and sequences charted. Diagram interpretation is emphasized.
Prerequisite: Mat 1125

FOURTH QUARTER

Elc 1125—Industrial Wiring Practices: Wiring methods in industrial complexes are covered, including wire sizing, splicing, and code. Raceways, wireways and duct systems are introduced. Accepted methods of wiring motors, motor starters, relays, and transformers are emphasized.
Prerequisite: Eln 1111

Eln 1130—Solid State Devices, Circuits and Symbols: Introduction to the theory and applications of solid state devices used in industry especially solid state control circuits for motors and related equipment. Basic transistor circuits, vacuum tubes, and basic vacuum tube circuits are covered.
Prerequisite: Elc 1105

**Dft 1108-C—Blueprint Reading:** A general course in interpreting blueprints. Analysis of electrical and pneumatic systems will be emphasized. Mechanical devices including piping, machines, gears and system color coding will be introduced.

Prerequisite: Dft 1109

**Elc 1130—Field Trips, Industrial Installations:** Industrial complexes will be toured under guided supervision. Visual inspections of electrical systems and informal discussions will take place concerning these systems.

Prerequisites: Elc 1104, Eln 1111

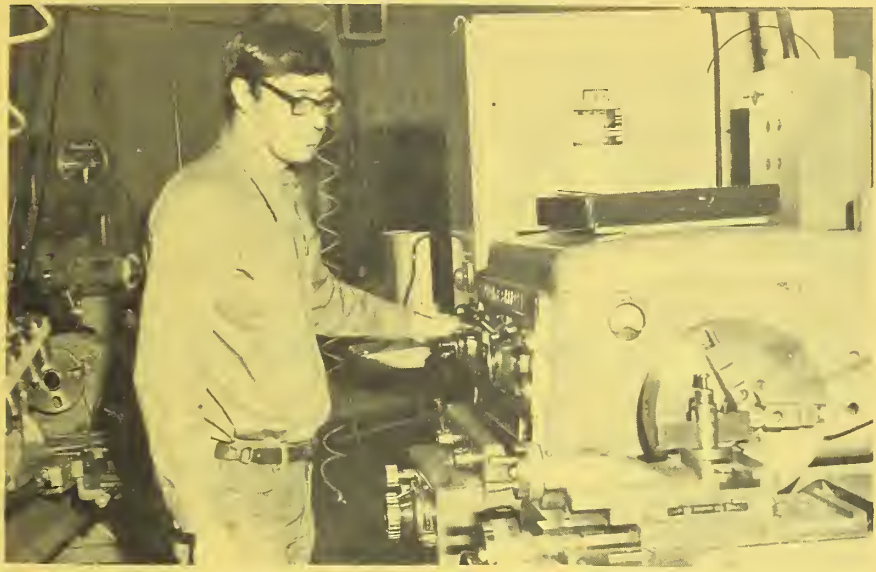
## MACHINE TRADES

This curriculum was prepared to meet a definite need for training of machinists. Surveys recently completed in North Carolina show that many of the existing industries lack time and facilities for training enough machinists to meet present and planned needs. Expanding industries already located in our State and new industries under development invariably express the need for skilled craftsmen who have the background knowledge and potential to advance.

This guide is designed to give learners the opportunity to acquire basic skills and the related technical information necessary to gain employment and build a profitable career in the machine shop industry in the State. It is comprised of the joint views of committes responsible for its development.

The machinist is a skilled metal worker who shapes metal parts by using machine tools and hand tools. His training and experience enable him to plan and carry through all the operations needed in turning out a machined product and to switch readily from one kind of product to another. A machinist is able to select the proper tools and material required for each job and to plan the cutting and finishing operations in their proper order so that he can complete the finished work according to blueprint or written specifications. He makes standard shop computations relating to dimensions of work, tooling, feeds, and speeds of machining. He often uses precision measuring instruments such as micrometers and gauges to measure the accuracy of his work to thousandths of an inch.

This skilled worker must be able to set up and operate most types of machine tools. The machinist also must know the composition of metals so that he can heat and quench cutting tools and parts to improve machinability. His wide knowledge enables him to turn a block of metal into an intricate, precise part.



## MACHINE TRADES

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | **Class** | **Lab** | **Shop** | **Credit** |
| MEC | 1101—Machine Shop Theory & Practice | 3 | 0 | 15 | 8 |
| ENG | 1101-C—Communication Skills | 2 | 0 | 0 | 2 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| DFT | 1104—Blueprint Reading | 2 | 0 | 3 | 3 |
| | | 12 | 0 | 18 | 18 |
| **SECOND QUARTER** | | | | | |
| MEC | 1102—Machine Shop Theory & Practice | 3 | 0 | 15 | 8 |
| MAT | 1102—Applied Mathematics | 5 | 0 | 0 | 5 |
| DFT | 1105—Blueprint Reading | 0 | 0 | 3 | 1 |
| WLD | 1101—Basic Welding | 1 | 0 | 3 | 2 |
| | | 9 | 0 | 21 | 16 |
| **THIRD QUARTER** | | | | | |
| MEC | 1103—Machine Shop Theory & Practice | 1 | 0 | 18 | 7 |
| MAT | 1106—Applied Mathematics | 3 | 0 | 0 | 3 |
| DFT | 1106—Blueprint Reading | 0 | 0 | 3 | 1 |
| MEC | 1115-C—Applied Metallurgy | 2 | 0 | 0 | 3 |
| ENG | 1102-C—Communication Skills | 2 | 0 | 0 | 2 |
| | | 9 | 0 | 21 | 16 |
| **FOURTH QUARTER** | | | | | |
| MEC | 1104—Machine Shop Theory & Practice | 2 | 0 | 15 | 7 |
| MEC | 1116-C—Applied Metallurgy | 0 | 0 | 3 | 1 |
| MAT | 1123—Machinists Mathematics | 5 | 0 | 0 | 5 |
| PHY | 1101—Applied Science | 3 | 2 | 0 | 3 |
| | | 10 | 2 | 18 | 16 |

# MACHINE TRADES

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

**Mec 1101—Machine Shop Theory and Practice:** An introduction to the machinist trade and the potential it holds for craftsmen. Deals primarily with the identification, care and use of basic hand tools and precision-measuring instruments. Elementary layout procedures and processes of lathe, drill press, grinding (off-hand) and milling machines will be introduced both in theory and practice.
Prerequisite: None

**Eng 1101-C—Communication Skills:** The first of two courses designed to improve the student's abilities in all areas of communications. Emphasis during the first quarter will be placed on the development of improved reading habits and basic composition skills.
Prerequisite: None

**Mat 1101—Applied Mathematics:** Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

**Dft 1104—Blueprint Reading:** Interpretation and reading of blueprints. Information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes.
Prerequisite: None

### SECOND QUARTER

**Mec 1102—Machine Shop Theory and Practice:** Advanced operations in layout tools and procedures, power sawing, drill press, surface grinder, milling machine shaper. The student will be introduced to the basic operations on the cylindrical grinder and will select projects encompassing all the operations, tools and procedures thus far used and those to be stressed throughout the course.
Prerequisite: Mec 1101

**Mat 1102—Applied Mathematics:** Basic concepts and operations of algebra: historical background of our base-10 number system; algebraic operations; addition, subtraction, multiplication and division; fractions, letter representation, grouping, factoring, ratio and proportions, variation; graphical and algebraic solution of first degree equations; solution of simultaneous equations by: addition and subtraction, substitution, graphing; exponents, logarithms, tables and interpolation.
Prerequisite: Mat 1101

**Dft 1105—Blueprint Reading:** Further practice in interpretation of blueprints as they are used in industry; study of prints supplied by industry; making plans of operations; introduction to drafting room procedures; sketching as a means of passing on ideas, information and processes.
Prerequisite: Dft 1104

**Wld 1101—Basic Welding:** Welding demonstrations by the instructor and practice by students in the welding shop. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding, bronze welding, silver soldering, and flame-cutting methods applicable to mechanical repair work.
Prerequisite: None

## THIRD QUARTER

**Mec 1103—Machine Shop Theory and Practice:** Advanced work on the engine lathe, turning, boring and threading machines, grinders, milling machine and shaper. Introduction to basic indexing and terminology with additional processes on calculating, cutting and measuring of spur, helical, and worm gears and wheels. The trainee will use precision tools and measuring instruments such as vernier height gages, protractors, comparators, etc. Basic exercises will be given on the turret lathe and on the tool and cutter grinder.
Prerequisite: Mec 1102

**Mat 1106—Applied Mathematics:** A continuation of Mat 1102 with the addition of fundamental formulas and equations dealing in areas of plane figures and volumes of solids. Geometric principles will be applied to shop operations.
Prerequisite: Mat 1102

**Dft 1106—Blueprint Reading:** Advanced blueprint reading and sketching as related to detail and assembly drawings used in machine shops. The interpretation of drawing of complex parts and mechanisms for features of fabrication, construction and assembly.
Prerequisite: Dft 1105

**Mec 1115-C—Applied Metallurgy:** Investigates the properties of ferrous metals and tests to determine their uses. Instructions will include some chemical metallurgy to provide a background for the understanding of the physical changes and causes of these changes in metals. Physical metallurgy of ferrous metals producing iron and steel, theory of alloys, shaping and forming, heat treatments for steel, surface treatments, alloy of special steel, classification of steels, and cast iron will be topics for study.
Prerequisite: None

**Eng 1102-C—Communication Skills:** A continuation of Eng 1101-C. In addition to reading and writing, the principles of effective speech will be practiced. Writing practice will include the filling out of job applications, composing personal history, statements, writing request for references, and then procedures related to job acquisition.
Prerequisite: Eng 1101-C

## FOURTH QUARTER

**Mec 1104—Machine Shop Theory and Practice:** Development of class projects using previously learned procedures in planning, blueprint reading, machine operations, final assembly and inspection. Additional processes on the turret lathe, tool and cutter grinder, cylindrical and surface grinder, advanced milling machine operations, etc. Special procedures and operations, processes and equipment, observing safety procedures faithfully and establishing of good work habits and attitudes acceptable to the industry.
Prerequisite: Mec 1103

**Mec 1116-C—Applied Metallurgy:** Continuation of the study of physical metallurgy. The non-ferrous metals: bearing metals (brass, bronze, lead), light metals (aluminum and magnesium), and copper and its alloys are studied. Powder metallurgy, titanium, zirmonium, indium and vanadium are included in this course.
Prerequisite: Mec 1115-C

**Mat 1123—Machinist Mathematics:** Introduces gear ratio, lead screw and indexing problems with emphasis on application to the machine shop. Practical applications and problems furnish the trainee with experience in geometric propositions and trigonometric relations to shop problems; concludes with an introduction to compound angle problems.
Prerequisite: Mat 1106

**Phy 1101—Applied Science:** An introduction to physical principles and their application in industry. Topics in this course include measurement; properties of solids, liquids, and bases; basic electrical principles.
Prerequisite: None

## MARINE DIESEL MECHANICS

Marine mechanics are in demand along the coastal waterways of North Carolina and other states where fishing and water recreation industries exist. This is a rapidly growing industry in many areas of the country. Single boat operations to large fleets exist for sport and commercial fishing and various recreational activities. These boats use propulsion systems ranging from one cylinder motors to large diesel units. These units require trained and skilled mechanics to maintain and service them for proper operation.

This program provides training for individuals interested in becoming mechanics to service and maintain the propulsion system for boats and various types of marine equipment. Manual skills in servicing marine equipment are developed in practical shop work. A thorough understanding of the operating principles of this equipment is provided through classroom instruction, laboratory experiments, group discussions and shop practice.

Marine engine mechanics maintain and repair mechanical, electrical, hydraulic, and pneumatic equipment used on boats and in industrial applications. Mechanics inspect and test to determine the causes of faulty operation; repair or replace defective parts to restore the machine or unit to proper operating condition; use shop manuals, manufacturer's maintenance manuals, and other technical publications.

Marine engine mechanics in smaller shops or self-employed persons usually are general mechanics qualified to perform a variety of repair jobs. A large number of marine engine mechanics specialize in particular types of repair work. For example, some may specialize in repairing only electrical equipment, or injector's servicing. Others specialize in clutches and power train equipment. Usually such specialists have an all-around knowledge of marine engine operation and may occasionally be called upon to do other types of work.

## MARINE DIESEL MECHANICS

| | | Hours Per Week | | | Quarter Hours Credit |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | |
| MDE | 1101—Marine Diesel Engines Theory & Practice | 6 | 0 | 9 | 9 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| PHY | 1101-C—Applied Science | 3 | 0 | 0 | 3 |
| MEC | 1101-C—Machine Shop Theory & Practice | 2 | 0 | 3 | 3 |
| ENG | 1101-C—Communication Skills | 2 | 0 | 0 | 2 |
| | | 18 | 0 | 12 | 22 |
| **SECOND QUARTER** | | | | | |
| MDE | 1102—Marine Diesel Engines Theory & Practice | 7 | 0 | 9 | 10 |
| MAT | 1102—Applied Mathematics | 5 | 0 | 0 | 5 |
| ELC | 1112—Direct Current Electricity | 1 | 0 | 3 | 2 |
| DFT | 1104—Blueprint Reading | 0 | 0 | 3 | 1 |
| ENG | 1102-C—Communication Skills | 2 | 0 | 0 | 2 |
| | | 15 | 0 | 15 | 20 |
| **THIRD QUARTER** | | | | | |
| MDE | 1103—Marine Diesel Engines Theory & Practice | 5 | 0 | 12 | 9 |
| ELC | 1113-C—Alternating and Direct Current Machines & Controls | 1 | 0 | 3 | 2 |
| WLD | 1101—Basic Welding | 1 | 0 | 3 | 2 |
| MSC | 1101—Safety at Sea | 1 | 2 | 0 | 2 |
| PSY | 1101—Human Relations | 2 | 0 | 0 | 2 |
| | | 10 | 2 | 18 | 17 |
| **FOURTH QUARTER** | | | | | |
| MDE | 1104—Marine Diesel Engines Theory & Practice | 5 | 0 | 12 | 9 |
| ELC | 1114-C—Motors, Generators and Controls | 1 | 0 | 3 | 2 |
| MEC | 1102-C—Machine Shop Theory and Practice | 0 | 0 | 6 | 2 |
| BUS | 1105—Industrial Organizations | 3 | 0 | 0 | 3 |
| | | 9 | 0 | 21 | 16 |

# MARINE DIESEL MECHANICS

## COURSE DESCRIPTIONS BY QUARTERS

### FIRST QUARTER

Mde 1101—Marine Diesel Engines Theory & Practice: Principles of main propulsion of vessels employing internal combustion engines. Construction and various designs of the operational principles of two- and four-cycle internal combustion engines and their related piping systems, cooling, fueling and lubrication. Study of the power train components, clutch, reduction gears, reverse gears, coupling, line shafting, and propellers. Procedures for "lighting off" operation, testing and recording engine performance, and servicing in a planned preventive maintenance program through periodic and recorded inspections. Principles of ventilation and heating of vessels, and the basic principles of steam generation where such method is employed as a medium of heating for comfort as well as providing fresh water.
Prerequisite: None

Mat 1101—Applied Mathematics: Practical number theory. Analysis of basic operations: addition subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

Phy 1101-C—Applied Science: An introduction to physical principles and their application in industry. Topics in this course include measurement; properties of solids, liquids, and gases; basic electrical principles. This is basically the same course as Phy 1101 except no lab is required. The extra lecture hour is used in lieu of lab for demonstrations from which data is taken and written up.
Prerequisite: None

Mec 1101-C—Machine Shop Theory and Practice: An introduction to the machinist trade and the potential it holds for craftsmen. Deals primarily with the identification, care and use of basic hand tools and precision-measuring instruments. Elementary layout procedures and processes of lathe, drill press, grinding (off-hand) and milling machines will be introduced both in theory and practice.
Prerequisite: None

Eng 1101-C—Communication Skills: The first of two courses designed to improve the student's abilities in all areas of communications. Emphasis during the first quarter will be placed on the development of improved reading habits and basic composition skills.
Prerequisite: None

### SECOND QUARTER

Mde 1102—Marine Diesel Engines Theory and Practice: Diesel engines and related auxiliaries and their relationship to the engineering plant and their application for operating various shipboard systems. Theory of filling, storage, purification, transfer of fuels, lubricants, water, and study of the various piping systems and their maintenance. Operation of pumps for fire system, drainage, main and secondary, and of their importance in maintaining stability and trim of the vessel.
Prerequisite: Mde 1101

Mat 1102—Applied Mathematics: Basic concepts and operations of algebra; historical background of our base-10 number systems; algebraic operations; addition, subtraction, multiplication and division; fractions, letter representation, grouping, factoring, ratio and proportions, variation; graphical and algebraic solution of first degree equations; solution of simultaneous equations by: addition and subtraction, substitution, graphing; exponents, logarithms, tables and interpolation.
Prerequisite: Mat 1101

**Elc 1112—Direct Current Electricity:** Basic electricity subjects include: structure of matter, electrical terminology and symbols, electron theory of current flow, magnets and magnet fields. Rigorous mathematical analysis of direct current resistive circuits. Ohm's Law, Kirchoff's Laws, Thevenin's Theorem, Norton's Theorem, the Superposition Principle and loop current method. Solution of complex resistive networks. Fundamental principles of inductors, capacitors, and time constants circuits are introduced.
Prerequisite: None

**Dft 1104—Blueprint Reading:** Interpretation and reading of blueprints. Information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes.
Prerequisite: None

**Eng 1102-C—Communication Skills:** A continuation of Eng 1101-C. In addition to reading and writing, the principles of effective speech will be practiced. Writing practice will include the filling out of job applications, composing personal history, statements, writing request for references, and then procedures related to job acquisition.
Prerequisite: Eng 1101-C

**THIRD QUARTER**

**Mde 1103—Marine Diesel Engines Theory and Practice:** Principles of operation of diesel generator plants and their application and operation in the production of electrical power for propulsion, steerage, internal communications, deck machinery, refrigerating plants, and the production of fresh water employing the electrical vapor distilling process of evaporation.
Prerequisites: Mde 1101 and Mde 1102

**Elc 1113-C—Alternating and Direct Current Machines and Controls:** Provides fundamental concepts in single and polyphase alternating current circuits, voltages, currents, power measurements, transformers, and motors. Instruction in the use of electrical test instruments in circuits analysis. The basic concepts of AC and DC machines and simple system controls. An introduction to the type control used in small appliances, such as: thermostats, timers, or sequencing switches.
Prerequisite: None

**Wld 1101—Basic Welding:** Welding demonstrations by the instructor and practice by students in the welding shop. Safe and correct methods of assembling and operating the welding equipment. Practice will be given for surface welding; bronze welding, silver-soldering, and flame-cutting methods applicable to mechanical repair work.
Prerequisite: None

**Msc 1101—Safety at Sea:** Consists not only of medical first aid, but also various life-saving drills held aboard ship, i.e. life-boat drill, fire-fighting drills, man overboard, etc. The fundamentals of anatomy and physiology are covered to enable the students to understand medical first aid basics such as compression points for the application of tourniquets for stopping the flow of blood. A comprehensive study of the symptoms and treatment of diseases are discussed. How to tend and nurse patients at sea, how to maintain a ship's hospital, and an understanding of the use of all the first aid equipment carried in the ship's medicine locker. Methods used to attain a high degree of ship sanitation. This includes handling of food, preparation of food, storage of food, upkeep of toilets and living quarters, disposal of garbage, and other wastes, and control of vermin and other disease-carrying pests. The importance of excellent standards of personal hygiene aboard ship. A practical study of various resuscitation equipment, oxygen-breathing apparatus, smoke masks, safety slings and stretchers.
Prerequisite: None

Psy 1101—Human Relations: A study of basic principles of behavior. The problems of the individual are studied in relation to society, group membership, and relationships within the work situation.
Prerequisite: None

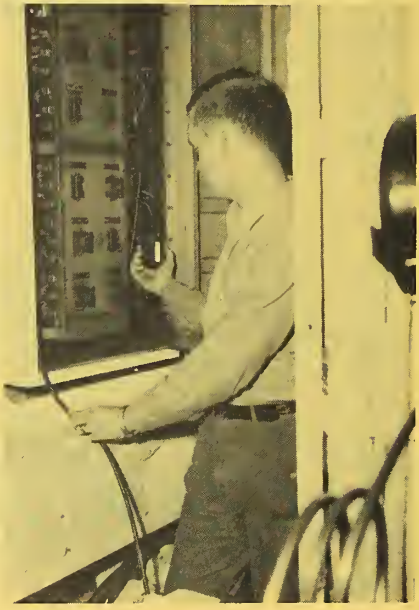
## FOURTH QUARTER

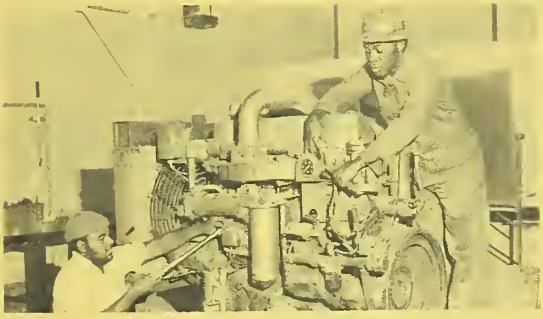
Mde 1104—Marine Diesel Engines Theory and Practice: The administration of Marine Engineering plants, through the recording and filling of performance data. Processing, recording, and storage of parts for the preventive maintenance program, and periodic inspections of machinery and component parts through the use of precision tools to determine conditions due to wear, and the replacement of such components in conference with recommended standards set forth by the manufacturer.
Prerequisites: Mde 1101, Mde 1102, Mde 1103

Elc 1114-C—Motors, Generators and Controls: A study of the fundamental concepts of AC and DC motors, generators and control of simple systems. Includes thermostats, timers, sequencing switches, etc.
Prerequisite: None

Mec 1102-C—Machine Shop Theory and Practice: Advanced operations in layout tools and procedures, power sawing, drill press, surface grinder, milling machine shaper. The student will be introduced to the basic operations on the cylindrical grinder and will select projects encompassing all the operations, tools and procedures thus far used.
Prerequisite: Mec 1101

Bus 1105—Industrial Organization: Methods, techniques, and practices of modern management in planning, organizing and controlling operations of a manufacturing concern. Introduction to the competitive system and the factors constituting product cost.
Prerequisite: None





## OPERATING ROOM ASSISTANT

With more new hospitals being built, and the rapid advancement in Surgical Techniques there is an increasing demand for more well-trained personnel in the Operating Room area.

The aim of the Operating Room Assistant Course is to make available to qualified persons the opportunity to prepare themselves to function intelligently under the direct and continuous supervision of qualified professional nurses in hospital areas which are concerned with principles and practices of Surgical Aseptics in Operating Rooms, Delivery Rooms, and Central Service Department.

Students are selected on the basis of demonstrated aptitude for O.R. Assistants as determined by pre-entrance tests, interviews with faculty members, including Surgeons, High School record, character references, and medical reports.

During the six-months course the student is expected to grow continuously in acquisition of knowledge and understanding, related to Operating Room Technique, Basic Anatomy, Physiology, Basic Microbiology, Aseptics, Communication Skills, Inter-personal relationship, and the use of good judgment. Evaluation of student performance consists of tests on all phases of course content, evaluation of clinical performance, and evaluation of adjustment to the responsibilities that is expected of an Operating Room Assistant. A passing score is required on all graded work, plus demonstrated progress in the clinical area of the Operating Room.

Students completing this Operating Room Assistant Course will be qualified to work in the Operating Room and assist the doctor or surgeon while under the supervision of the professional nurse.

## OPERATING ROOM ASSISTANT

| Course Title | Hours Per Week Class | Lab | Clinic | Quarter Hours Credit |
|---|---|---|---|---|
| **FIRST QUARTER** | | | | |
| ORA 1101 Operating Room Assistant I | 12 | 0 | 9 | 15 |
| **SECOND QUARTER** | | | | |
| ORA 1102 Operating Room Assistant II | 6 | 0 | 18 | 12 |

### FIRST QUARTER

**Ora 1101—Operating Room Assistant I:** Basic Anatomy and Physiology of the human body, which consist of the nerves, muscles, bones, blood vessels and the different systems of the body. Basic Microbiology which consists of the many different microorganisms or "germs" and how they affect our body. Ethics and communications will be taught in this quarter.

Lab.—Some introduction into the Operating Room in observing the actual working of this area.

### SECOND QUARTER

**Ora 1102—Operating Room Assistant II:** Operating Room technique as related to actual practice scrubbing and setting up for operations. Learning the instruments and packs, how they are set-up and autoclaved or sterilized. Scrubbing in with a nurse and assisting with operations. Learning the basic principles of Sterile Technique as a Scrubbed Assistant or a Circulating Assistant. Ethics and communication skills will continue in this quarter.

Lab.—In the Operating Rooms and Central Sterile Service.

## PRACTICAL NURSE EDUCATION

The accelerated growth of population in North Carolina and rapid advancement in medical technology demand an increased number of well-trained personnel for health services. Realizing this need, the State Department of Community Colleges, in conjunction with local hospitals, administers programs of practical nurse education in local systems, community colleges, technical institutes and in industrial education centers throughout the state.

The aim of the Practical Nurse Education Program is to make available to qualified persons the opportunity to prepare for participation in care of patients of all ages, in various states of dependency, and with a variety of illness conditions.

Students are selected on the basis of demonstrated aptitude for nursing as determined by pre-entrance tests, interviews with faculty members, high school record (students in this program must be a high school graduate or the equivalent*), character references, and reports of medical and dental examination.

Throughout the one-year program the student is expected to grow continuously in acquisition of knowledge and understanding related to nursing, the biological sciences, the social sciences and in skills related to nursing practice, communications, interpersonal relations, and use of good judgment. Evaluation of student performance consists of tests on all phases of course content, evaluation of clinical performance, and evaluation of adjustment to the responsibilities of nursing. A passing score is required on all graded work, plus demonstrated progress in application of nursing skills to actual patient care.

Graduates of accredited programs of practical nurse education are eligible to take the licensing examination given by the North Carolina Board of Nursing. This examination is given twice each year, usually in April and September. A passing score entitles the individual to receive a license and to use a legal title "Licensed Practical Nurse." The license must be renewed annually. The Licensed Practical Nurse can apply for licensure in other states on the basis of a satisfactory examination score, without repeating the examination.

*See page 186 in General Adult Education Section for details about the high school equivalency certificate.

The LPN is prepared to function in a variety of situations: hospitals of all types, nursing homes, clinics, doctors' and dentists' offices and, in some localities, public health facilities. In all situations the LPN functions under supervision of a registered nurse and/or licensed physician. This supervision may be minimal in situations where the patient's condition is stable and not complex; or it may consist of continuous direction in situations requiring the knowledge and skills of the registered nurse or physician. In the latter situation, the LPN may function in an assisting role in order to avoid assuming responsibility beyond that for which the one-year program can prepare the individual.

Job requirements for the Licensed Practical Nurse include suitable personal characteristics, ability to adapt knowledge and understandings of nursing principles to a variety of situations, technical skills for performance of bedside nursing, appreciation for differences of people and for the worth of every individual, a desire to serve and help others, and readiness to conform to the requirements of nursing ethics and hospital policies.

## PRACTICAL NURSE EDUCATION

### CURRICULUM BY QUARTERS

| Course Title | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|
| FIRST QUARTER | Class | Lab | Clinic | Credit |
| NUR 1101—Practical Nursing I | 25 | 2 | 3 | 27 |
| SECOND QUARTER | | | | |
| NUR 1102—Practical Nursing II | 12 | 2 | 21 | 20 |
| THIRD QUARTER | | | | |
| NUR 1103—Practical Nursing III | 10 | 2 | 24 | 19 |
| FOURTH QUARTER | | | | |
| NUR 1104—Practical Nursing IV | 10 | 2 | 24 | 19 |

## PRACTICAL NURSE EDUCATION

### FIRST QUARTER

Nur 1101—Practical Nursing I:

OBJECTIVES: To assist beginning students in practical nursing to acquire basic knowledge from nursing and from related areas of learning and to begin to develop the skills needed for safe and effective bedside care of patients whose health deviation has created a state of dependency in matters of daily living.

Course Material:

Nutrition

Nursing Skills—Introduction to patient care.

Health—Personal, physical and mental; family; community.

Basic Science—Body structure and function; bacteriology.

Vocational Adjustments—Introduction to ethics and legal aspects of nursing, history, Communication and Human Relations.

Classroom activities are planned to assist students in development of knowledge, understanding, appreciations, and attitudes basic to effective nursing of patients of all ages and backgrounds with nursing needs arising both from the individuality of the patient and from inability for self-care as a result of a health deviation. The student is encouraged to develop beginning skills in analysis of patients needs, both through classroom study of hypothetical patient situations and through planned patient experiences in the clinical environment. Beginning skills in nursing methods are developed through planned laboratory experiences, followed by related practice in actual patient care.

Clinical activities provide introduction to actual patient care through selected clinical assignments requiring application of current classroom and laboratory learnings.

Prerequisite: Admission requirements

### SECOND QUARTER

Nur 1102—Practical Nursing II:

OBJECTIVES: To assist practical nursing students to acquire further knowledge and understanding and to develop further skills needed for rendering safe and effective nursing care to patients of all ages.

Course Material:

Medical—Surgical I
Pediatrics I, II, III

Classroom activities center around analysis of nursing needs as viewed in perspective with the needs arising from the individuality of the patient and from the illness condition. Related information is presented as it is relevant to the student's understanding of and ability to meet nursing needs of patients.

Clinical activities provide selected experiences in patient care in order for the student to develop skill in applying classroom learnings to a variety of patient situations.
Prerequisite: Nur 1101

**THIRD QUARTER**

Nur 1103—Practical Nursing III:

OBJECTIVES: To assist practical nursing students to acquire knowledge of common disease conditions and to develop beginning skills in rendering safe and effective nursing care to patients of all ages with specific needs arising from the illness and/or therapy.

Course Material:

Medical—Surgical II
Obstetrics
Drugs and Drug Administration

Classroom activities center around analysis of nursing needs arising from the specific illness condition and the medical plan.

Clinical activities consist of guided experiences in nursing patients with conditions which illustrate classroom learnings.
Prerequisite: Nur 1102

**FOURTH QUARTER**

Nur 1104—Practical Nursing IV:

OBJECTIVES: To assist advanced practical nursing students to acquire knowledge of needs of patients who are seriously ill, to develop beginning skills in assisting the registered nurse and/or physician in complex nursing situations, and to make the transition to the role of graduate practical nurse.

Course Material:

Medical—Surgical II and III
First Aid
Civil Defense

Classroom activities center around the needs of seriously-ill patients of all ages, of labor patients, and of patients immediately following surgery.

Clinical activities consist of guided experiences in the care of seriously-ill patients, labor patients, and surgery patients, and is planned to parallel classroom learnings whenever possible.
Prerequisite: Nur 1103

## RADIO & TELEVISION SERVICING (ELECTRONIC SERVICING)

Within recent years improved electronic techniques have provided expanded entertainment and educational facilities in the form of monochrome and color television, frequency-modulated radio, high-fidelity amplifiers and sterophonic-sound equipment. These developments require expanded knowledge and skill of the individual who would qualify as a competent and up-to-date serviceman.

This curriculum provides a training program which includes the basic knowledge and skills involved in the installation, maintenance and servicing of radio, television and sound-amplifier systems. A large portion of time is spent in the laboratory verifying electronic principles and developing servicing techniques.

A radio and television serviceman may be required to install, maintain and service amplitude-modulated and frequency-modulated home and auto radios, transistorized radios, monochrome and color television sets, intercommunication, public address and paging systems, high-fidelity and stereophonic amplifiers, record players and tape recorders.

His work will require meeting the public both in the repair shop and on service calls. A serviceman who establishes his own business will also need to know how to maintain business records and inventory.

## RADIO & TELEVISION SERVICING (ELECTRONIC SERVICING)

### CURRICULUM BY QUARTERS

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| ELC | 1104-C—Basic Electricity | 12 | 0 | 6 | 14 |
| ENG | 1101-C—Communication Skills | 2 | 0 | 0 | 2 |
| MAT | 1101—Applied Mathematics | 5 | 0 | 0 | 5 |
| | | 19 | 0 | 6 | 21 |
| **SECOND QUARTER** | | | | | |
| MAT | 1102—Applied Mathematics | 5 | 0 | 0 | 5 |
| ENG | 1102-C—Communication Skills | 2 | 0 | 0 | 2 |
| ELN | 1122-C—Vacuum Tubes and Circuits | 2 | 0 | 6 | 4 |
| ELN | 1126-C—Transistor Theory and Circuits | 4 | 0 | 6 | 6 |
| | | 13 | 0 | 12 | 17 |
| **THIRD QUARTER** | | | | | |
| ELN | 1125-C—Radio Receiver Servicing | 3 | 2 | 0 | 4 |
| PSY | 1101—Human Relations | 2 | 0 | 0 | 2 |
| ELN | 1127-C—Tele. Receiver Circuits & Servicing | 6 | 4 | 0 | 8 |
| ELN | 1128—Transistor Theory and Circuits | 5 | 0 | 3 | 6 |
| | | 16 | 6 | 3 | 20 |
| **FOURTH QUARTER** | | | | | |
| ELN | 1131-C—Tele. Receiving Service (includes color) | 11 | 0 | 12 | 15 |
| BUS | 1103—Small Business Operations | 2 | 0 | 0 | 2 |
| | | 13 | 0 | 12 | 17 |

## RADIO & TELEVISION SERVICING (ELECTRONIC SERVICING)

### COURSE DESCRIPTIONS BY QUARTERS

**FIRST QUARTER**

**Elc 1104-C—Basic Electricity:** A study of the structure of matter and the electron theory. The relationships between voltage, current, and resistance in series, parallel, and series-parallel circuits. Mathematical analysis of direct current resistive circuits using Ohm's Law, Thevenin's Theorem, Norton's circuits. Fundamental principles of capacitors, inductors, and time constants. Introduction to alternating current flow. A study of reactance, impedance, phase angle, and resonance. Particular attention is given to the use of electrical measuring devices.
Prerequisite: None

**Eng 1101-C—Communication Skills:** The first of two courses designed to improve the student's abilities in all areas of communications. Emphasis during the first quarter will be placed on the development of improved reading habits and basic composition skills.
Prerequisite: None

**Mat 1101—Applied Mathematics:** Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.
Prerequisite: None

## SECOND QUARTER

**Mat 1102—Applied Mathematics:** Basic concepts and operations of algebra: historical background of our base-10 number system; algebraic operations; addition, subtraction, multiplication and division; fractions, letter representation, grouping, factoring, ratio and proportions, variation; graphical and algebraic solution of first degree equations; solution of simultaneous equations by: addition and subtraction, substitution, graphing; exponents, logarithms, tables and interpolation.

Prerequisite: Mat 1101

**Eng 1102-C—Communication Skills:** A continuation of Eng 1101-C. In addition to reading and writing, the principles of effective speech will be practiced. Writing practice will include the filling out of job applications, composing personal history, statements, writing request for references, and then procedures related to job acquisition.

Prerequisite: Eng 1101-C

**Eln 1122-C—Vacuum Tubes and Circuits:** An introduction to vacuum tubes and their development; the theory, characteristics and operation of vacuum diodes, semi-conductor diodes, rectifier circuits, filter circuits, triodes and simple voltage amplifier circuits.

Prerequisite: Elc 1104-C

**Eln 1126-C—Transistor Theory and Circuits:** Transistor theory, operation, characteristics and their application to audio and radio frequency amplifier and oscillator circuits.

Prerequisite: Elc 1104-C

## THIRD QUARTER

**Eln 1125-C—Radio Receiver Servicing:** Principles of radio reception and practices of servicing; included are block diagrams of radio receivers, servicing techniques of AM and FM receivers by resistance measurements, signal injection, voltage analysis, oscilloscope methods of locating faulty stages and components and the alignment of AM and FM receivers.

Prerequisite: Eln 1122-C

**Psy 1101—Human Relations:** A study of basic principles of human behavior. The problems of the individual are studied in relation to society, group membership, and relationships within the work situation.

Prerequisite: None

**Eln 1127-C—Television Receiver Circuits and Servicing:** A study of principles of television receivers, alignment of radio and intermediate frequency amplifiers, adjustment of horizontal and vertical sweep circuits will be taught. Techniques of troubleshooting and repair of TV receivers with the proper use of associated test equipment will be stressed. Additional study of more specialized servicing techniques and oscilloscope waveform analysis will be used in the adjustment, troubleshooting and repair of the color television circuits.

Prerequisite: Eln 1122-C

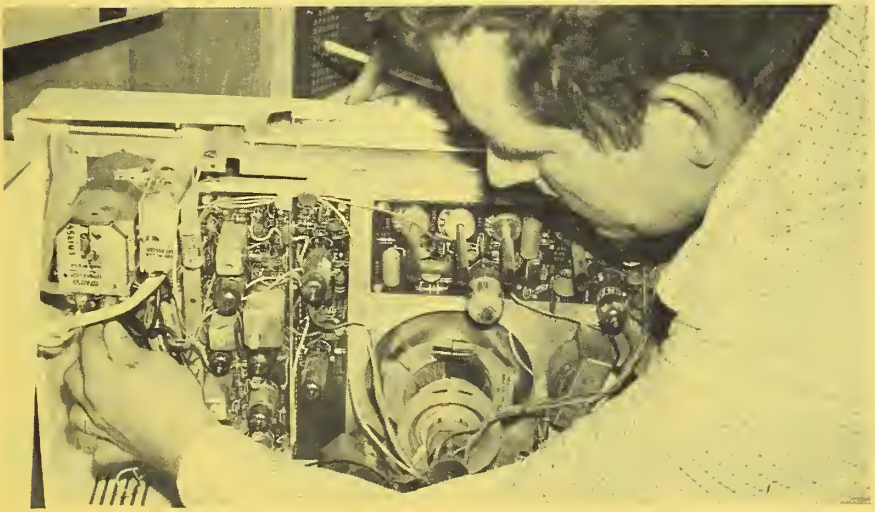
**Eln 1128—Transistor Theory and Circuits:** Emphasis will be placed on techniques of trouble shooting and repair of TV receivers with the proper use of associated test equipment. This course will be primarily based upon application of principles previously studied.

Prerequisite: Eln 1126

## FOURTH QUARTER

**Eln 1131-C—Television Receiver Servicing (includes color):** A broad servicing course including trouble shooting, radios, television, record players, sound systems, and other electronic communication devices. Major emphasis will be placed upon studying colored television principles and theories. The service and repair of colored television sets will be included for laboratory work.
Prerequisite: Eln 1127-C

**Bus 1103—Small Business Operations:** An introduction to the business world, problems of small business operation, basic business law, business forms and records, financial problems, ordering and inventorying, layout of equipment and offices, methods of improving business, and employer-employee relations.
Prerequisite: None



## WELDING

This curriculum was developed to fill the tremendous need for welders in North Carolina. The recently completed Manpower Survey shows quite clearly that many welders will be needed annually to fill present and projected vacancies in the State.

The content of this curriculum is designed to give students sound understanding of the principles, methods, techniques and skills essential for successful employment in the welding field and metals industry.

The field of welding offers a person prestige, security and a future of continuous employment with steady advancement. It offers employment in practically any industry: shipbuilding, automotive, aircraft, guided missiles, railroads, construction, pipe-fitting, production shop, job shop and many others.

Welders join metals by applying intense heat, and sometimes pressure, to melt the edges to form a permanent bond. Closely related to welding is "oxygen cutting." Of more than 35 different ways of welding metals, arc, gas, and inert gas welding are the three most important.

The principal duty of the welder using manual techniques is to control the melting by directing the heat from either an electric arc or gas welding torch, and to add filler metal where necessary to complete the joint. He should possess a great deal of manipulative skill with a knowledge of jigs, welding symbols, mathematics, basic metallurgy, and blueprint reading.

## WELDING

| | | Hours Per Week | | | Quarter Hours |
|---|---|---|---|---|---|
| **FIRST QUARTER** | | Class | Lab | Shop | Credit |
| WLD | 1121—Arc Welding | 3 | 0 | 12 | 7 |
| DFT | 1104-C—Blueprint Reading | 1 | 0 | 3 | 2 |
| MEC | 1115-C—Applied Metallurgy | 3 | 0 | 0 | 3 |
| MAT | 1101-C—Applied Math | 3 | 0 | 0 | 3 |
| | | 10 | 0 | 15 | 15 |
| **SECOND QUARTER** | | | | | |
| WLD | 1120—Oxacetylene Welding and Cutting | 3 | 0 | 12 | 7 |
| MAT | 1102-C—Applied Math | 3 | 0 | 0 | 3 |
| MEC | 1116-C—Applied Metallurgy | 3 | 0 | 0 | 3 |
| DFT | 1112—Blueprint Reading for Welding | 1 | 0 | 3 | 2 |
| | | 10 | 0 | 15 | 15 |
| **THIRD QUARTER** | | | | | |
| WLD | 1122—Commercial and Industrial Practices | 0 | 0 | 3 | 1 |
| WLD | 1123—Inert Gas Welding (Tig, Mig, Plasma) | 3 | 0 | 9 | 6 |
| DFT | 1117-C—Blueprint Reading: Welding | 0 | 0 | 3 | 1 |
| ENG | 1101-C—Communication Skills 5½ wks. | 4 | 0 | 0 | 4 |
| ENG | 1102-C—Communication Skills 5½ wks. | | | | |
| PHY | 1101-C—Applied Science | 3 | 0 | 0 | 3 |
| | | 10 | 0 | 15 | 15 |
| **FOURTH QUARTER** | | | | | |
| WLD | 1124—Pipe Welding | 3 | 0 | 6 | 5 |
| WLD | 1125—Certification Practices | 0 | 0 | 6 | 2 |
| PHY | 1103—Applied Science | 3 | 2 | 0 | 4 |
| DFT | 1118-C—Pattern Development and Sketching | 0 | 0 | 3 | 1 |
| PSY | 1101—Human Relations | 2 | 0 | 0 | 2 |
| | | 8 | 2 | 15 | 14 |

## WELDING

### COURSE DESCRIPTION BY QUARTERS

### FIRST QUARTER

**Wld 1121—Arc Welding:** The operation of AC transformers and DC motor generator arc welding sets. Studies are made of welding heats, polarities, and electrodes for use in joining various metal alloys by the arc welding process. After the student is capable of running beads, butt and fillet welds in all positions are made and tested in order that the student may detect his weaknesses in welding. Safety procedures are emphasized throughout the course in the use of tools and equipment.

Prerequisite: None

**Dft 1104-C—Blueprint Reading:** Interpretation and reading of blueprints. Information on the basic principles of the blueprint; lines, views, dimensioning procedures and notes.

Prerequisite: None

**Mec 1115-C—Applied Metallurgy:** Investigates the properties of ferrous metals and tests to determine their uses. Instructions will include some chemical metallurgy to provide a background for the understanding of the physical changes and causes of these changes in metals. Physical metallurgy of

ferrous metals producing iron and steel, theory of alloys, shaping and forming, heat treatments for steel, surface treatments, alloy of special steel, classification of steels, and cast iron will be topics of study.

Prerequisite: None

**Mat 1101-C—Applied Mathematics:** Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion. Plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.

Prerequisite: None

SECOND QUARTER

**Wld 1120—Oxyacetylene Welding and Cutting:** Introduction to the history of oxyacetylene welding, the principles of welding and cutting, nomenclature of the equipment, assembly of units. Welding procedures such as practice of puddling and carrying the puddle, running flat beads, butt welding in the flat, vertical and overhead position, brazing, hard and soft soldering. Safety procedures are stressed throughout the program of instruction in the use of tools and equipment. Students perform mechanical testing and inspection to determine quality of the welds.

Prerequisite: None

**Mat 1102-C—Applied Mathematics:** A study of basic concepts of mathematics in a direct relationship to Drafting. Transactions, decimals, powers and roots, percentages, ratio and proportions. An introduction to Trigonometry used in Drafting.

Prerequisite: Mat 1101-C

**Mec 1116-C—Applied Metallurgy:** Continuation of the study of physical metallurgy. The non-ferrous metals; bearing metals (brass, bronze, lead), light metals (aluminum and magnesium) and copper and its alloys are studied. Powder metallurgy, titanium, zirconium, indium and vanadium are included in this course.

Prerequisite: Mec 1115-C

**Dft 1112—Blueprint Reading for Welding:** A thorough study of trade drawings in which welding procedures are indicated. Interpretation, use and application of welding symbols, abbreviations, and specifications.

Prerequsite: Dft 1104-C

THIRD QUARTER

**Wld 1122—Commercial and Industrial Practices:** Designed to build skills through practices in simulated industrial processes and techniques: sketching and laying out on paper the size and shape description, listing the procedure steps necessary to build the product, and then actually following these directions to build the product. Emphasis is placed on maintenance, repairing worn or broken parts by special welding applications, field welding and nondestructive tests and inspection.

Prerequisite: Wld 1121

**Wld 1123—Inert Gas Welding (Tig, Mig, Plasma):** Introduction and practical operations in the use of inert-gas arc welding. A study will be made of the equipment, operation, safety and practice in the various positions. A thorough study of such topics as: principles of operation, shielding gases, filler rods, process variations and applications, manual and automatic welding.

Prerequisite: Wld 1121

**Dft 1117-C—Blueprint Reading: Welding:** A thorough study of trade drawings in which welding procedures are indicated. Interpretation, use and application of welding symbols, abbreviations, and specifications.

Prerequisites: Dft 1104-C, Dft 1112

**Eng 1101-C—Communication Skills:** The first of two courses designed to improve the student's abilities in all areas of communications. Emphasis will be placed on the development of improved reading habits and basic composition skills.

Prerequisite: None

**Eng 1102-C—Communication Skills:** A continuation of Eng 1101. In addition to reading and writing, the principles of effective speech will be practiced. Writing practice will include the filling out of job applications, composing personal history, statements, writing request for references, and then procedures related to job acquisition.

Prerequisite: Eng 1101-C

**Phy 1101-C—Applied Science:** An introduction to physical principles and their application in industry. Topics in this course include measurement; properties of solids, liquids, and gases; basic electrical principles. This is basically the same course as Phy 1101 except no lab is required. The extra lecture hour is used in lieu of lab for demonstrations from which data is taken and written up.

Prequisite: None

## FOURTH QUARTER

**Wld 1124—Pipe Welding:** Designed to provide practice in the welding of pressure piping in the horizontal, vertical and horizontal-fixed position using shielded metal arc welding processes according to Sections VIII and IX of the ASME code.

Prerequisite: Wld 1121

**Wld 1125—Certification Practices:** This course involves practice in welding the various materials to meet certification standards. The student uses various tests including the guided bend and the tensile strength tests to check the quality of his work. Emphasis is placed on attaining skill in producing quality welds.

Prerequisites: Wld 1121, Wld 1122, Wld 1123

**Phy 1103—Applied Science:** Will discuss briefly heat and thermometry, principles of force, motion, work, energy, and power. Study principles of operation of the basic electric welding machines—AC, DC, AC-DC combination with high frequency and motor generator. Industrial gases, their discovery and use in industry—oxygen, acetylene, argon, hydrogen, helium carbon dioxide—and their mixtures such as 25% $CO^2$ and 75% argon, 98% argon and 2% oxygen.

Prerequisite: Phy 1101-C

**Dft 1118-C—Pattern Development & Sketching:** This course is designed for the student who has the basic knowledge of blueprint reading and sketching. It presents the practical shop or field layout methods used by pipe welders. Layouts are made on templet paper beginning with the simple pan and progressing to the most complex lateral connections that are used in industrial pipings. The student learns the steps in making rectangular and cylindrical layouts and patterns of offsets and intersections used on commercial jobs.

Prerequisites: Dft 1104-C, Dft 1112

**Psy 1101—Human Relations:** A study of basic principles of human behavior. The problems of the individual are studied in relation to society, group membership, and relationships within the work situation.

Prerequsite: None

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# EXTENSION & GENERAL ADULT EDUCATION DIVISION

## EXTENSION DIVISION

The Cape Fear Technical Institute provides training in numerous areas through its Extension programs. Extension classes are held both at the school and at various locations throughout New Hanover, Brunswick and Pender Counties. These classes are designed to prepare individuals for employment or to upgrade workers already employed.

The extension department also serves area industries and public agencies by providing training for their employees. Training under this division of the Institute can be offered at any time a need for such training is established. Full details can be obtained by contacting the Director of Extension programs at the school.

### Admission Requirements

Generally speaking any individual who is 18 years of age or whose high school class has graduated is eligible for admission to extension classes; applicants are usually admitted on the first come, first served basis. Some classes may have specific admission requirements, in such cases the Director of Extension programs will inform applicants of these requirements.

### Expenses

Many of the extension classes are offered without charge to the students; in other cases a small fee is charged to cover the cost of instructional supplies. Any charges should be paid at the first class session.

### Certificates

The Extension Division issues certificates to those who complete a course satisfactorily.

## EXAMPLES OF EXTENSION PROGRAMS OFFERED

Air Conditioning & Refrigeration
Aircraft Assembly
Auto Mechanics
Auto Electricity
Basic Electronics
Blueprint Reading
Commercial Fishing
Crab Processing
Electricity
Electronic Circuits
Furniture Upholstery
Instrumentation
Janitorial Maintenance
Loom Fixing
Machine Shop Practice
Marine Diesel Mechanics
Metal Burning
Net-Making & Mending
Power Sewing
Slide Rule
Small Engine Repair
Supervisory Development Courses
Tailoring
Tourist Serving Training
Waitress Training

### AGRICULTURAL

Farm Records
Fertilizers and Lime
Pesticides
Welding for Farmers
Ornamental Horticulture

### BUSINESS

Typing
Bookkeeping
Shorthand

### CONSTRUCTION

Bricklaying
Carpentry
Housewiring
Plumbing

### PUBLIC AGENCIES

Fire Training
Fire Officer Training
Fire First Aid
Nurses' Aide
Orderlies Training
Police Training
Teacher Aides

### SUPERVISORY DEVELOPMENT

The Art of Motivating People
Effective Writing
Effective Speaking
Human Relations
Industrial First Aid
Effective Communications
Job Methods
Industrial Safety & Accident Prevention
Job Analysis Training
Work Measurement

This list, of course, is in no way comprehensive, but is offered as a general sample of extension-type courses. For further information on this division contact the Director of Continuing Education.

## GENERAL ADULT EDUCATION

The General Adult Education division of the Cape Fear Technical Institute is primarily concerned with raising the educational level of adults and providing cultural improvement courses. The Institute is prepared to provide training at all educational levels from grade one (learning to read and write) up through high school equivalency. This training is provided through organized classes and through the school's Programmed Instruction Centers.

## HIGH SCHOOL EQUIVALENCY CERTIFICATE

The State of North Carolina, through the State Board of Education permits adults (18 years of age) to take the General Educational Development Tests, (generally referred to as "the High School Equivalency Examination") at test centers throughout the State. Persons who make satisfactory scores on all five sections of the test are issued the High School Equivalency Certificate by the State Board of Education. This certificate is recognized by most industries, schools, and government agencies as meeting their requirement for a high school education. Cape Fear Technical Institute is a G.E.D. test center. The test is generally given once each month; applications for the tests may be obtained from the Institute or from the office of any school superintendent.

The Institute provides training in the five areas covered by the examination both through organized classes and the Learning Laboratory.

## ORGANIZED CLASSES

Classes in adult education are organized as follows:

Basic Education I — For those adults who have completed less than four grades of formal education.

Basic Education II — For those adults who stopped school in grades 5-8 or who have completed Basic Education I.

Secondary I — For those adults who stopped school in grades 9-10 or who have completed Basic Education II.

Secondary II — For those adults who stopped school in grades 11-12 or who have completed Secondary I.

The school's Programmed Instruction Center provides training for those who are not able to attend the organized classes. See the Programmed Instruction Center (page 188 for full details).

In addition to the organized classes at the basic and secondary education levels, the General Adult Division offers a large variety of courses both at the school and throughout the area it serves. The types and frequency of these offerings are determined by the demand and interest in a given area of study. A sampling of courses under this heading would include:

Law for the Layman

Homemaking — Sewing and Food Preparation

Driver Education for Adults

Remedial Mathematics for the Prospective College Student

Remedial English for the Prospective College Student

Modern Math for Parents

Conversational French

Conversational Spanish

Speed Reading and Reading Improvement

Creative Art

Creative Writing

Public Speaking

Citizenship Studies for Naturalization

Interior Decorating for Homeowners

First Aid

Auto Mechanics for Car Owners

Ceramic Arts and Crafts

Additional courses are offered as the demand becomes evident. Details of these and other courses may be obtained from the Director of General Adult Education.

### Admission Requirements

Any adult who has a desire to raise his or her educational level and who is able to benefit from a course may enroll in the general adult classes.

### Expenses

There is no charge for the Basic Education and only a small fee to cover the cost of instructional materials in the Secondary I and II classes. Charges for other general adult classes are determined by the length of the course and instructional materials needed.

## PROGRAMMED INSTRUCTION CENTER

### The Cape Fear Technical Institute Programmed Instruction Center — A Brief Summary of What It Is

The Programmed Instruction Center at the Cape Fear Technical Institute is designed to provide study opportunities in practically any field that might be of interest to residents of the New Hanover, Pender or Brunswick County area.

Persons interested in participating in the Programmed Instruction Center, after an initial interview, are provided study materials starting at a point in keeping with their achievement level and are able to progress from there. Students may elect study times adjusted to their convenience and schedules.

A "Programmed Instruction Center" is essentially an individual study situation, in which any person eighteen years of age or older may undertake most any level of Reading, English, Math, Social Studies, or Science that he desires. All of the material used in the lab is programmed; therefore, there is no need for a classroom teacher. In fact, efforts have been made to remove all semblances of a classroom from the Programmed Instruction Center.

Programmed material is designed in such a manner as to aid the student in learning information in small sequences called "Frames." Each frame requires an immediate response, and each response is immediately checked. If the student fails to learn, or learns incorrectly, the program makes the correction or re-teaches. In this manner the student progresses at his own rate; he neither has to wait for others to catch up nor slow down to someone else's rate.

The coordinator, the person in charge of the Programmed Instruction Center, has the responsibility of locating the level at which a student can proceed to learn by himself, of formulating the sequence of programs the student will undertake to achieve his desired goal, and of administering the tests that will assure the student that he is approaching his goal.

Because there are no classes in the learning lab, there is no need for anyone to wait until the new quarter to enroll. Each student sets his own work sessions and attends the lab as many days each week and as many hours each day as he thinks he can attend regularly. There are no fees, and any adult can take as many courses as fit his needs.

The majority of students presently enrolled in Programmed Instruction Center are seeking to prepare themselves for the high

school equivalency examination or to gain educational improvement of their own choosing. Some, however, are enrolled to upgrade themselves for a possible job promotion; while others are using the program for reinforcement in a technical institute curriculum or in their college work.

### Admission Requirements for Programmed Instruction Center

Any adult over 18 years of age who has a desire to raise his or her educational level and who is able to benefit from study in the Programmed Instruction Center may enroll.

### Expenses

There is no charge for study in the Programmed Instruction Center.

### Courses

Some of the fields in the Programmed Instruction Center are: Mathematics, English, Foreign Languages, Reading Improvement, Social Sciences, Natural Sciences, Nursing, Electronics, and Business. Courses are added almost daily. There are over 400 different courses offered now.

### Locations

There are two Programmed Instruction Centers in operation now. One is in the building, room 416, of Cape Fear Technical Institute and another is at the Neighborhood Facility on South Walker Rd. (South 117 Business) in Burgaw.

### New Industry Training

One of the basic objectives of Cape Fear Technical Institute is to stimulate the creation of more challenging and rewarding jobs for the people of our area by providing a customized training service to new and expanding industries. Subject to only minimal limitations, this institution, in cooperation with the Industrial Services Division of the State Department of Community Colleges, will design and administer a special program for training the production manpower required by any new or expanding industry creating new job opportunities in North Carolina.

This program includes the following services:

1. Consultation in determining job descriptions; defining areas of training; and in prescribing appropriate course outlines. training schedules, and materials.
2. Selecting and training of instructors. These instructors may be recruited from the company and from outside sources.

3. Payment of instructors' wages for the duration of the training program.
4. Provision of suitable space for a temporary training facility prior to the completion of the new plant, should such temporary space be required. This may be space with Cape Fear Technical Institute or leased space in the community.
5. Assumption of installation costs of equipment in the temporary training facility.
6. Payment for one-half the cost of nonsalvageable materials expended in the training program.

The purpose of this service is to help a new or expanding industry meet its immediate manpower needs and to encourage each industry to develop a long-range training program of its own to satisfy its continuing replacement and re-training needs.

For further details of this service, please contact the President, Cape Fear Technical Institute or the Director, Industrial Services Division, North Carolina Department of Community Colleges, Raleigh, North Carolina.

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